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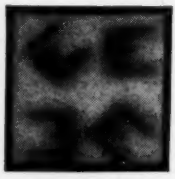
Sun glasses are available with two kinds of lenses. Coquille or micoquille lenses (used in the cheap sun glasses) which are unsafe for your eyes and optically ground and polished lenses (used in the better sun glasses) which are safe for your eyes. Although there is very little apparent difference between these two types of lenses, coquille lenses are usually defective. Proof is the photograph (left below) of an image cast by a coquille goggle lens. Defects which cause such distortion in a photograph can cause untold damage to eyes. Compare this with the sharp clear image (right) cast by an optically ground and polished lens. Ground and polished lenses cut down glare without impairing eyesight in any way.



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AMERICAN JOURNAL OF OPHTHALMOLOGY

VOLUME 19 JULY, 1936 NUMBER 7

MEGALOCORNEA

Report of a case with gonioscopic findings

MANUEL URIBE TRONCOSO, M.D. AND ISADORE E. GIVNER, M.D.
NEW YORK

A detailed study of a case of megalocornea disclosed that: A. With all the present available methods of endocrine study, nothing abnormal could be discovered. B. With the aid of the gonioscope, (1) marked atrophy of the ciliary portion of the iris and the zone of the ciliary body visible in the anterior chamber could be discerned, (2) no evidence of obstruction by anterior peripheral synechia was present, but, on the contrary, a widely open angle and enlargement of the anterior chamber was found. C. In the apparent overgrowth of the entire anterior segment it seemed logical to conclude that only the cornea and scleral limbus were involved, the other portions being merely stretched to conform with this enlargement. From the Institute of Ophthalmology, Columbia-Presbyterian Medical Center.

Keratoglobus or megalocornea is an hereditary adult disease, occurring bilaterally, the characteristic features of which are enlarged cornea, deep anterior chamber, iridodonesis, and a tendency to cataract formation.

Among the earliest descriptions of this condition is that of Horner[1] who, in 1889, differentiated it from buphthalmos.

The theories regarding the etiology have included increased intraocular tension, endocrine disturbances, atavistic retrogressions, and hyperplasia of unknown origin.

Among proponents of the first theory may be included Harlan[2] who, in 1898, suggested the probability that "the cornea in the period of its development perhaps somewhat retarded, yielded to the pressure caused by an excessive secretion of aqueous humor, or obstruction to its outflow by incomplete separation of the iris from the cornea. In the latter case there may be a fair chance of self-limitation of the disease, as the bulging of the cornea and stretching of the iris would tend to open up the angle of the anterior chamber."

Recently Curran[3] expressed the view that there may exist in embryonic life "some condition simulating glaucoma ... sufficient to cause an increase in the growth of the anterior segment."

Seefelder[4] adhered to the belief that an endocrine disturbance was the exciting factor, taking up Fischel's suggestion of the influence of the "inner secretion" of the retina. Absolute evidence of the existence of such or any laboratory findings of a disturbed endocrinology is, however, to date still lacking.

Reis[5] and later Friede[6] considered the condition an atavistic throwback, citing the fact that normally in lower animals and in the newborn the anterior segment is proportionately larger than in the adult.

Staehli[7] regarded megalocornea as an hereditary hyperplasia in which, at a later date, atrophy of the iris with dispersion of pigment followed. When in the future, our knowledge of the growth-stimulating and growth-inhibiting factors of the cornea shall have become more complete, more definite etiological facts may be found.

Recently Vail[8] in a comprehensive monograph emphasized the fact that the pathologic changes that characterize this disease are not limited to the cornea but involve the anterior chamber, the iris, lens, and zonular fibers.

An opportunity to observe a case of this comparatively rare disease was recently presented and an effort was made: (a) to determine, by a complete medical and endocrinological survey, whether or not disturbances of this nature could be elicited; (b) to study the

Fig. 1 (Troncoso and Givner). Stereoscopic picture of the left eye.

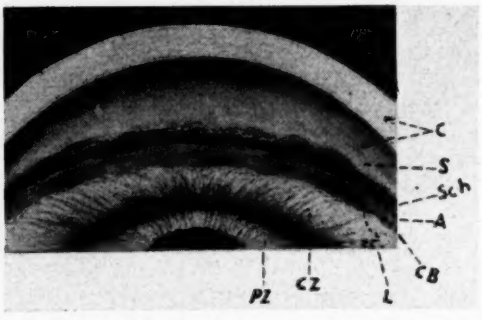

Fig 2 (Troncoso and Givner). The angle of the anterior chamber as seen with the gonioscope in a case of megalocornea. PZ, pupillary zone of the iris; CZ, ciliary zone of the iris; L, last roll of the iris; CB, ciliary-body band; A, black line sharply dividing the ciliary body from Sch, Schlemm's zone; S, scleral band; C, cornea.

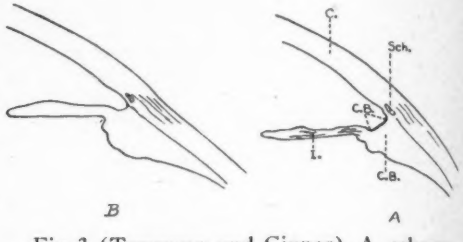

Fig 3 (Troncoso and Givner). A, schematic section of the angle in megalocorneal: I, iris; C.B., ciliary body; Sch., Schlemm's canal; C, cornea. B, section of a normal angle for comparison.

Fig 4 (Troncoso and Givner). Iris as seen by transillumination. PZ, pupillary zone, CZ, ciliary zone.

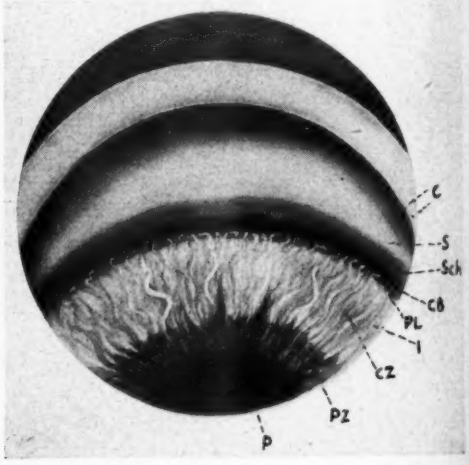

Fig. 5 (Troncoso). Appearance of the angle of the anterior chamber of a normal eye as seen with the gonioscope. C, cornea; S, scleral band; Sch, Schlemm's band; CB, ciliary-body band; PL, iris processes (pectinate ligament) appearing at the edge of the iris. These fibers are not commonly seen in such large numbers in all normal eyes. I, iris; CZ, ciliary zone; PZ, pupillary zone; P, pupil.

angle of the anterior chamber to establish whether arguments could be deduced to support or overthrow contentions of an obstruction here in fetal or postnatal life, and; (c) to conclude whether the growth factor included all of the portions of the anterior segment or were the result of the growth of only the cornea and the adjacent scleral limbus.

Case report

G. S., a male, white, married, aged 28 years, presented himself on January 14, 1935, with the history of never having worn glasses until six years ago, because he never had felt the necessity for them. At that time he began getting more nearsighted, so that now his lenses are quite strong. His past history was irrelevant. He had been reared in an orphan asylum and had no knowledge of any of his relatives. He was married at the age of 13 and has seven children, the youngest being six months of age. (Examination of these children ophthalmologically was negative.)

Physical examination was entirely negative except for alopecia of both cheeks, shaving being necessary only twice a week. The abdomen bears a scar from a burn.

Laboratory findings. Blood Chemistry: Uric acid 2.5 mg. per 100 c.c.; urea nit. 12.2 mg. per 100 c.c.; chlorides as NaCl. 0.445 per 100 c.c.; calcium 10.8 per 100 c.c.

Hemoglobin, 80 percent; 4,200,000 red blood corpuscles. Total white blood corpuscles, 7,000; 70 percent polymorphonuclears; 28 percent lymphocytes; eosinophils, 1.5 percent; basophils, 0.5 percent.

Basal Metabolism: +2

X-rays of skull show the orbit, sella turcica, teeth, long bones, and hands entirely negative. No evidence of rarefaction, irregularity of structure, nor increase in length was noted.

Prolan A, negative.

Glucose tolerance test, normal.

Blood Sugar	Urine	
Time	Sugar %	mg.
1st hr. 0.090%	214	0.05–167
2d hr. 0.174%	20	0.11–22
3d hr. 0.158%	30	1.22–36

Ophthalmological Examination. Vision, O.D. —13.50 D. sph. ⌯ —2.00 D. cyl. ax. 75° = 20/30; O.S. —13.00 D. sph. ⌯ —2.00 D. cyl. ax. 165° = 20/30.

The lids together with the lacrimal puncta, lacrimal sac, and conjunctiva were negative. The ocular muscles were normal.

The cornea of the right eye measured 12½ mm. x 15 mm. Gerontoxon was present in its lower portion. There were two corneal maculae in the superficial stroma near the center, but no tears in Bowman's or Descemet's membrane. The ophthalmometer showed that the convexity of the cornea was, R.E. 42.5 D. with a 7.9 radius in the horizontal meridian and 43 D. with 7.8 radius in the vertical. The L.E. had a convexity of 42.5 D. with a 7.9 radius in the horizontal and 44.2 D. with a 7.6 mm. radius in the vertical. The corneal nerves were markedly visible, extending about 4 to 5 mm. in toward the center of the cornea from the limbus. On the posterior surface were a few pigment deposits.

The cornea of the left eye measured 13½ mm. x 14 mm. Gerontoxon was present in its lower portion. There was a corneal macula in the superficial stroma near the center, but no tears in Bowman's or Descemet's membrane. The corneal nerves were prominent, extending inward from the limbus 5.7 mm.

There was no thinness on optical section of either eye.

Anterior chamber of both eyes appeared to be three times the normal depth, the aqueous clear. The pupils were equal, 5 to 6 mm. in width, not eccentric, and responded readily to light, in accommodation, and consensually. Full dilation was secured in ten minutes with cocaine and adrenalin, indicating the retention of active dilators.

The iris was slightly translucent; crypts were absent inferiorly and temporally. Towards the ciliary-body region, radial fibers took on a wavy course. The lesser circle could be made out in the left eye but not in the right eye where it was only suggestive. The color was a greyish green, the retinal pigment, brown.

On the anterior surface of the iris were many fine dustlike particles of pigment. There was iridodonesis of both irides.

Transillumination showed many radiating slits as depicted in figure 4.

The lens in both eyes showed a few deposits of remnant of pupillary membrane; also some slight opacities in the fetal nucleus.

In the vitreous were many fine and few hairlike opacities in each eye; the consistence was more fluid than is normally found.

The fundus of the right eye showed a slight conus superiorly and inferiorly with a marked diminution in the retinal pigment nasal to the disc. In the macula there were areas of depigmentation and hyperpigmentation. In the left eye, the disc, color, and vessels were normal. No conus or pigment change was evident similar to the nasal portion of right eye, but the macula showed some pigment changes.

The tension in both eyes was 8 mm. Hg (Schiötz).

Fields. The blind spots were normal. There was very moderate concentric contraction, easily explicable by the high myopia.

Gonioscopic Examination: The first thing to strike the observer was the enormous depth of the anterior chamber. The whole iris was pushed far back with the result that the angle of the anterior chamber was very wide and rounded.

Studying the structures from the pupil, they appeared as follows (fig. 2): The pupillary border was normal, the pupillary zone of the iris (PZ) had a yellowish color and normal radiations. The lesser circle was lower, but apparent. The ciliary zone of the iris (CZ) had a greenish, faded color. It was shorter radially than in normal eyes and its fibers were thinner and discolored. The outer fold (L) was flattened and pushed back instead of prominent, as in normal eyes. It could not be easily distinguished from the ciliary body, except for the marked contrast in the aspect of the structures. The ciliary-body band (CB) was extremely wide, smooth, and light-yellowish in color. The receding iris had stretched and drawn back the ciliary body, with the result that the angle had a rounded appearance (fig. 3). The ciliary-body band (CB) was bound upward by a very striking, black, clear-cut, straight line, (A) which marked the insertion of this organ into the sclera. Immediately above, Schlemm's band (Sch) was covered with a large amount of pigment which in its lower border was almost black, while above it changed gradually to dark yellow. This pigmented band was made of numerous, scattered, black pigment granules, deposited in the meshes of the trabeculum. Beyond Schlemm's band the white scleral band (S) was considerably wide. The section of the cornea (C) appeared to be of normal thickness.

The black band (Sch) could at first sight be taken for the normally darker ciliary-body band (compare with CB in the normal eye, fig. 5), because the atrophic iris and ciliary body were not clearly distinguished from each other. It was only when the insertion into the corneal limbus was studied, that the ciliary body was recognized as the outer yellowish smooth band, which was stretched, rounded, and pushed back. Looking through the contact glass alone with a strong loupe and the light of the gonioscope or a flash light, the exact location of the pigment upon Schlemm's meshwork could be directly observed. In this way also transillumination could be made to show that the red slits in the iris already mentioned (fig. 4) corresponded to the ciliary zone and ended at the beginning of the ciliary-body band.

Comments. The finding of a normal serum calcium with the absence of skeletal changes does not lend support to any relationship between megalocornea and arachnodactylia. The criticism of judging the present findings as though they were constant factors, however, is justified.

In general, nothing in the medical or laboratory survey lends support to disturbed endocrinology. However, with the advent of newer methods of approach the present conclusion may have to be altered.

Some authors have contended that eyes affected with keratoglobus have a predisposition to glaucoma and assume that there is an embryonic maldevelopment of the filtration angle, or even a peripheral synechia. This is not in accord with the present gonioscopic findings. Likewise those who conclude that keratoglobus is due to an arrested buphthalmos derive no tangible support from the absence of evidence of angle occlusion or peripheral synechia.

On the other hand, many cases of megalocornea are hypotonic. In Vail's statistics, case 5 had an intraocular tension of 10 mm. (Souter); Petres[9] mentions one case with intraocular tension of 14 mm., another with 19 mm. and speaks of a third as having been hypotonic. Kayser[10] in nine cases found three with decreased tension. In the present case the tension was 8 mm. (Schiötz) on repeated observations. This hypotony may be ascribed to two factors: first, to an increased outflow due to the enlarged size of Schlemm's canal and meshwork by the hyperplasia of the cornea and limbus. This will permit the increased amount of aqueous contained in the anterior chamber to be eliminated faster than in a normal eye. Second, to an atrophy of the ciliary processes which reduces the amount of aqueous outflow and disturbs the normal balance with widened channels of outflow. This atrophy is concomitant with that of the iris and depends on the stretching to which it is exposed.

In explanation of the cases which do show increase of tension not associated with subluxation of the lens, the outflow may be hindered by the mechanical obstruction of Schlemm's canal either by pigment (Rochon-Duvigneaud[11]) or by sclerosis of the meshwork and wall of the canal. In addition, the atrophy of the iris might hinder the rate of aqueous absorption by this membrane. In the present case, however, although there was a large amount of pigment deposited in the meshwork, it did not seem to obstruct the channel, the tension being as low as it was.

Finally, we wish to consider what portions of the eye share in the enlargement. Seefelder[12] considered megalocornea as an abnormal overgrowth or gigantism of the whole eyeball. This was refuted by Kayser[10] who showed that in fifteen cases the radius of curvature of the cornea varied from 6.8 mm. upward (normal, 7.6 mm. to 7.9 mm.). In eight cases it was smaller than 7.8 mm. and in four cases the radius was within normal measurement. He showed that if the whole eye were enlarged, the cornea would have to have a radius of 10 to 12 mm. In addition to this the normal-sized lenses that have been extracted in capsule speak likewise against gigantophthalmus.

The size of the whole eyeball has not been consistently recorded in all cases. The normal average transverse diameter is 24.13 mm. and the vertical 23.48 mm. (Duke-Elder). In the present case it was 25 mm. in both horizontal and vertical meridians, but the patient was myopic 13 diopters.

Kayser stated, "It is a natural consequence of megalocornea that the scleral opening on which the cornea locks is correspondingly enlarged and just so the iris diaphragm and ciliary body must be correspondingly enlarged, which indeed is accessible in part to direct observation."

Although, of course, no final conclusions can be drawn from the observation of a single case, yet in the light of gonioscopic examination it seems doubtful that other structures than the cornea and scleral limbus have taken part in the process of enlargement. The iris and ciliary body appeared considerably stretched, to follow in one dimension the widening of the ring of insertion into the sclera and in the other the increase in the radial size. The iris was not much changed in the pupillary zone but in the ciliary zone it had become so stretched that it was discolored, atrophic, and thinned to such an extent that it was reduced to thin fibers, showing black against the red background upon transillumination.

The anterior ciliary body appeared, gonioscopically, considerably stretched and atrophic. The ordinary depression beyond the root of the iris, that is the chamber sinus, was absent and the iris and ciliary body looked like a con-

tinuous, depressed concave membrane (fig. 3) giving the angle a round aspect from the uveal insertion into the sclera to the pupil. The marked tremulousness of the lens and iridodonesis point to an atrophy and slackening of the zonular fibers by stretching.

Summary

1. As a basis for megalocornea, disturbed endocrinology is not supported by the accepted laboratory procedures of the day.

2. The considerable stretching found in the ciliary body and iris is not in accord with the theory of overdevelopment of the entire eyeball nor even of the anterior segment in its entirety, for the size and relations of the structures of the angle were not proportional to the enlargement of the cornea.

3. The gonioscopic findings do not give support to the theory of drainage obstruction, at least not by peripheral synechia. On the other hand, the presence of hypotony in this and other cases in the literature point to either diminished outflow or atrophy of the ciliary body due to stretching.

4. Cases of megalocornea presented in the future should be tabulated giving specific data concerning endocrinology, X-ray, and gonioscopic findings.

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THE CHEMISTRY OF THE RETINA

II. Chemical Constitution

ARLINGTON C. KRAUSE, M.D.
CHICAGO

The proportions of the various chemical constituents of the retina have been determined and are given in this paper. From the Johns Hopkins Hospital and University and from the Division of Ophthalmology, Department of Surgery, The University of Chicago.

There is an imperative need for a careful investigation of the chemical processes and nature of the retina. Much of its chemistry may possibly be correlated to its comparative and pathological histology. The great tendency in the past has been to explain many of the normal and abnormal appearances of the retina, as they are seen ophthalmoscopically and microscopically, by words that describe the picture or that suggest vague chemical conceptions of the condition. Thus such explanations as endocrine imbalance, abiotrophy, malnutrition, and dietary deficiency have been often used indiscriminately and thoughtlessly. A chemical exploration of the retina should aid in overcoming this lack of knowledge.

In spite of being the most essential ocular tissue, the retina has been little studied chemically. Indeed, the only report on the chemical constitution of the retina was published in 1881 by Cahn.[1] He determined the percentage of soluble and insoluble protein, cholesterol, lecithin, cerebrin, fat, soluble extracts, and inorganic material of the ox, hog, and horse retina. But the methods which he used have been either greatly improved or discarded as unsuitable. Leinfelder and Salit,[2] Krause,[3] and Lo Cascio[4] studied the distribution of retinal lipids, and Fischer[5] performed an analysis of the inorganic substances of the retina. A more detailed study of the constitution of organic substances, particularly the lipid-protein, is therefore needed as an introduction to the investigation of visual purple and the visual process.

The purpose of this communication is to give a report on an investigation of the chemical composition of the retina.

Experimental procedure

Twenty retinas were carefully dissected and weighed in a glass-stoppered weighing bottle. They were then ground in a mortar and suspended in sufficient distilled water to make the total volume equal to 100 c.c. A 10-c.c. sample was withdrawn for total solids and 25 c.c. for insoluble substances. The insoluble material was extracted with two 50-c.c. portions of 1-, 5-, and 10-percent solutions of sodium chloride. The insoluble residue was washed with distilled water until the wash water was free of chlorides. The insoluble material was then extracted with 5- to 25-c.c. portions of boiling alcohol and with boiling ether. The remaining residue was termed "insoluble protein" and weighed. The alcohol and ether extracts were evaporated to dryness. The residue was weighed and was recorded as lipids.

The saline extracts were diluted to a convenient volume. A sample was acidified with acetic acid, coagulated with heat, washed with water, extracted with alcohol and ether, weighed, and recorded as protein of the soluble substances. The alcohol and ether extracts of the heat-coagulable protein were evaporated, dried, weighed, and reported as lipids.

The following procedure was used to determine water-soluble extracts and to check the efficiency of the determination of the insoluble and soluble substances. A 25-c.c. sample was slightly acidified with acetic acid to give a pH 6.2 and then heated in a boiling water bath. The heat-coagulable protein was centrifuged off, washed with water, extracted with alcohol and ether, dried, and weighed. The alcohol and ether extracts were evaporated to dryness. The residue was weighed and recorded

as lipids. The supernatant fluid from the heat-coagulable protein was evaporated to dryness, weighed, and recorded as extractives. The extractives were ashed.

Total lipids and total ash were determined on a sample of retina previously desiccated to a constant weight over sulphuric acid in a vacuum at room temperature.

In determining the composition of retina relative to age, eyes of cows varying from 7 to 14 years in age (age estimated by veterinarian) and of steers ranging from 2 to 4 years were used. The eyes of steers being more uniform in regard to age gave a more satisfactory analysis.

All substances were desiccated to a constant weight over sulphuric acid and a vacuum at room temperature. Aqueous solutions were kept at pH 6.8 or at the pH as recorded.

Comment

The retina may be regarded in a chemical sense as two separate tissues; namely, the pigment epithelium and the neuroepithelium. In contrast to the former, the latter is easily obtained from the mammalian eye. This is the tissue which was taken for analysis.

The chemical constitution of the bovine neuroepithelium is given in table 1. As may be expected, the percentage of water decreases and the insoluble substances increase with age. It is not probable that this change arises from differences in sex or in nutrition; it results mainly from processes of age. A similar change occurs in the lens and in many other tissues of the body.

Table 1

CHEMICAL CONSTITUTION OF BOVINE RETINA

Substances	Steers, aged 2–4 years			Cows, aged 7–10 years		
	Sample Number			Sample Number		
	(1) Percent	(2) Percent	(3) Percent	(1) Percent	(2) Percent	(3) Percent
Total solids of fresh retina	11.9	12.6	12.2	14.2	13.4	13.1
Dry Weight						
Water-insoluble substances	9.1	9.3	9.0	11.1	10.6	10.6
Lipoid-protein fraction	9.1	9.3	9.0	11.1	10.6	10.6
Protein	5.3	5.4	5.6	6.2	5.9	6.1
Lipid	3.7	3.9	3.5	4.8	4.7	4.4
Water-soluble substances	88.5	88.5	89.7	88.2	88.4	88.6
Lipid-protein fraction	69.0	68.6	70.2	69.1	70.6	69.8
Protein (heat coag.)	51.9	51.3	52.7	51.3	52.4	51.2
Lipid	17.2	17.3	17.5	17.7	18.3	18.4
Nonprotein extractives	19.4	20.3	19.5	19.0	17.7	17.5
Ash (of soluble substances)	6.5	6.4	6.7	6.7	6.9	6.9
Total lipid	22.3	21.6	21.4	22.6	23.0	22.9
Total ash	7.8	7.1	7.4	7.0	7.4	7.1

The process causing the loss of water from the colloidal retinal tissue may be covered by the terms syneresis and hysteresis, but the use of these terms adds little or nothing to the knowledge of this process. The increase of insoluble substances is commonly seen in tissues which become more metabolically inert.

The neuroepithelium differs from most other tissues in that it is composed chiefly of complex lipid-proteins of unknown nature. It is proper to assume that most of the retinal lipid of the neuroepithelium is a part of these lipid-proteins and that it is not free and is not an absorption product of the protein. Only the true fats are probably free. The insoluble structural proteins apparently are in part composed of

lipid. The collagen, reticulin, elastin, and neurokeratin (the keratin of nervous tissue) may possibly form the protein group of these insoluble proteins, or it may be that these insoluble proteins absorb or retain lipid. The soluble lipid-proteins are complex and are unstable, particularly in acid solutions. The acidosis resulting from death of the cells tends to break up the lipid-protein into lipid and protein. The lability of the lipid-protein toward mild treatment gives rise to difficulty in its isolation and characterization.

The retinal proteins that are soluble in water and in solutions of sodium chloride are: mucoids, histones, globulins, albumins, proteoses, peptones, polypeptides, a protein behaving like livetin and another like vitellin. Since mucoids of the eye are generally soluble in solutions of sodium chloride, it is probable that the mucoid is chiefly in the soluble-protein fraction. The greatest part of the soluble retina protein, however, is composed of a lipid-protein which possesses the properties of vitellin in that it is soluble in a 5- to 8-percent solution of sodium chloride and not in water. The chemical behavior of these proteins prevents a good separation of the retinal protein by methods using only water for extraction.

The extraction with ether of a retina suspended in cold aqueous or saline solution results in an uncontrollable emulsion. Only a part of the fat is extracted. Up to the present, no technique could be devised to isolate quantitatively the different soluble proteins. Many attempts were made but either the analyses could not be repeated with precision or the protein could not be positively identified.

The soluble organic extractives consist chiefly of nonprotein nitrogenous substances, purines, acids, organic phosphates, carbohydrates, and salts.

Summary

The chemical constitution of the bovine retina has been determined. Most of the proteins are complex lipid-proteins of nervous-tissue origin. The amount of supporting-tissue proteins is relatively small.

The technical procedures were performed with the aid of Mr. W. Tauber. The eyes were obtained through the courtesy of Mr. R. Fox.

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SURGICAL TREATMENT OF SEPARATED RETINA BY THE GALVANIC METHOD

CLIFFORD B. WALKER, M.D.
LOS ANGELES

The use of multiple galvanic micro-needle punctures, with ¾-M.A. negative current for one or two seconds, for the treatment of separated retina was studied both on animal eyes without detachment and on human eyes with detachment. The work of Vogt was confirmed in practically every detail. It was, however, found to be advantageous to make several changes in technique. For instance, the anode is not used on the sclera but may be kept as far away as the diathermic pad on the shoulder, which then may serve both units. This is made possible by raising the galvanic voltage to 45. Only unipolar ocular application is made with finer, nonbreakable, iridium-platinum rather than steel, needle electrodes. A special galvanic unit was assembled that could be used either separately or connected to a diathermy machine, so that either galvanic or diathermic current would be available from separate handles by a single turn of the tripolar switch, installed on the panel. Some excellent cures were obtained in certain detachment types, with very little postoperative reaction and scar-tissue formation. Other groups required diathermy additionally or entirely. Presented before the American Ophthalmological Society, at Hot Springs, Virginia, in June, 1935.

The great variety of modalities, procedures, and instruments that may be used in applying the galvanic current to the eye doubtless accounts for the long delay in finding just the right technique for the cure of separated retina.

In 1893, Abadie[1] and Schoelers,[2] and in 1894, Schoelers and Albrand[3] tried a large number of variables, not only of the cathode but also of the anode, on both the animal eye and the human eye for the healing of separated retina. The column of hydrogen bubbles left in the vitreous along the line of the active cathode needle was noted, yet the tear in the retina was not given special attention nor was it specially treated in Verhoeff's[4] pioneer work in this country. During the early period, others also experimented with various applications of galvanic current to the eye, both with surface and with penetrating electrodes, without uncovering further useful facts with relation to separated retina. As a rule, in all the work done before that of Vogt, the doses were too excessive, the penetrating electrodes were too large, and, still more unfortunately, were not directed at the tears. If the tears had been given more direct treatment, encouraging results would doubtless have established the method among the recognized treatments for separated retina many years ago.

In 1933-34 von Szily and Machemer[5] did considerable laboratory work with both uni- and bipolar surface treatment with the galvanic current and they also used the diathermic gas bubble as a tracer. But the large diathermic bubble consisting of 32-percent nitrogen, 10-percent oxygen, and 2-percent CO_2, as well as of 56-percent hydrogen, forms only at the base or chorioscleral zone of the electrode needle where the diathermic effect and treatment are almost exclusively active, while the needle point produces no bubbles and no treatment to the retina but merely mechanical injury, in case it reaches that distance, as Vogt has emphasized. On the other hand, the small numerous hydrogen bubbles formed by the galvanic current along the whole course of the cathode needle are superior for localization and indicate the uniformity of treatment throughout the puncture channel.

In 1934 Vogt,[6, 7] in utilizing the hydrogen bubbles for purposes of localization of the retinal tear, the significance of which by that time was well understood as compared with what was known during the period of the early workers, noted that small tears could be closed by the cathodal NaOH deposited in the tear by the fine localization needle with which several punctures had been made through the tear opening, its retinal margins, and on farther somewhat into the vitreous during the process of localization. The dose, at first larger than necessary, was reduced until as finally[8, 9] used it varied from one-half to 1 M.A. of cathodal galvanic current for about one second for each puncture. The anode was applied to the sclera of

the same eye perhaps a centimeter or more distant from the cathode needle with which the sclera was being perforated. This could be done with a single dry cell. Some splendid cures with little reaction and scarring were reported.

Electrical rearrangements

During January of 1935, in testing out Vogt's method ("catholysis"), it was found advisable to make certain changes. First, to get rid of the troublesome anode on the sclera and obtain a smoother current, a galvanic unit which I had been using previously for treating macular hole with nascent NaOH instead of injecting 3 percent KOH (Lindner method[10]) was modified as follows: The double-cell battery was changed to a multi-dry-cell 45-volt "B" battery. This increased potential permitted the removal of the anode or positive pole as far away as the shoulder blade. A suitable rheostat of 5 M.A. capacity was installed for the meter, easily readable to one tenth of one milliampere. These changes not only gave more operative room but also avoided the acid burn on the sclera and the conjunctival chemosis which the ball-tip anode produced if not carefully moved from place to place during a long operation for treatment of multiple tears. The danger also was removed of the assistant's exerting too much pressure accidentally on the eyeball or of failing to contact the eyeball at all, thus permitting the micro-needle to puncture the retina, perhaps making a new hole in the retina without treatment to close it again.

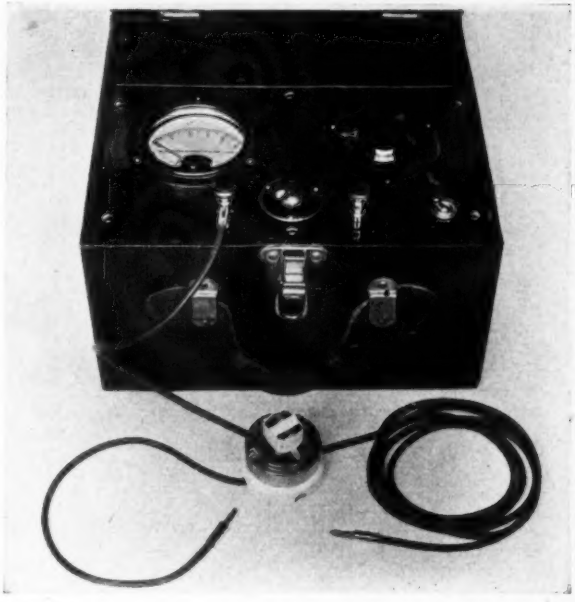

Fig. 1 (Walker). B-battery galvanic unit with 1/10-M.A. divisions over a 5-M.A. meter scale for Vogt catholysis and treatment of the macula.

Hook-up with diathermy

A still further advantage was also gained in that the same shoulder-pad electrode could be used for the diathermy machine as well as for the galvanic unit. To obtain this advantage, the cord from the galvanic pole is properly connected through an ordinary three-way switch (fig. 1) into the line from the indifferent pole of my diathermic unit, then either diathermic or galvanic current becomes available alternately from corresponding treatment handles by simply snapping this one switch.

It should be observed in describing this hook-up that the diathermic foot-switch is not changed and works as usual on the primary circuit, so that the diathermic unit is entirely "dead" at all times except when the foot-switch is used. Neither unit can in any way affect the other. It is only the large indifferent-pad electrode that is switched from one unit to the other by means of the three-way switch. Of course, the whole change could be effected with a more complicated five-pole foot-switch, but the simple three-way switch is clearly marked with colors as well as letters and is easily manipulated without error by the operating-room nurse. The units may be obtained, either separately or combined in one portable case of about the same size and weight as the diathermic unit alone, from the E. J. Rose Mfg. Company, 727 East Gage Avenue,

Los Angeles. In several instances, when tears were very large, I have used both methods on the same eye, and in one of these I also gave an alkali injection for a macular hole.

I have found, as Vogt records, that the catholysis method requires that the treatment be made accurately in the ground or hole area and in or on the margins of the retinal tears. Generally no galvanic encircling barrage, as with diathermic micro-puncture, is necessary, although it may be well tolerated; nor will a wide galvanic barrage alone effect a reattachment if the hole and its margins are left untreated. I find further that the hole itself requires the most treatment, so that I have even ventured to doubt that the margins, although difficult to avoid, must necessarily be perforated by the needle in order to obtain a reattachment, provided the treatment is properly applied to the retinal margins without perforation, as will be discussed later (cf. 1st case report).

Maintenance of clear cornea

The necessity for greater accuracy in treating the retinal-hole areas calls for greater precision in localization, which in turn demands, among other things, the clearest cornea possible and also a very wide pupil, in order to secure, throughout the operation, more durable control with an ophthalmoscope having a strong illumination.* In many instances these requirements, especially the repeated use of ophthalmoscopic control, make the operation more difficult than that of diathermic micro-puncture. It seems to me somewhat disarming when Vogt calls this method simpler than other methods and encourages the use of an ordinary epilatory set. Many of these sets do not have the proper batteries, nor do they have sufficiently accurate and finely divided ammeters. Yet even if, on this account, some eyes are poorly treated in the early stages of experience with the method, I must add that, by using Vogt's method with several modifications, I have been able to duplicate his splendid results on some separated retinas even more damaged than those reported in his recent article.[6]

Transilluminating localization

In 1931 I used transillumination localization for demonstrations on certain

* These requirements may be largely met by preparation of the eye the night before the operation, by subconjunctival injection of adrenalin and cocaine mixture at the operation, and by putting a new battery and bulb in the ophthalmoscope. Anesthesia without the use of drops is also necessary to maintain a clear cornea. I have gradually adopted the following sequence as the most satisfactory: Eight hours before the operation, 1½ grains of Nembutal by mouth. Again, two hours before the operation, 1½ grains of Nembutal by mouth. One hour before operation, 1/12 morphine sulph. and 1/200 scopolamin by hypodermic, and again 15 minutes before operation the same hypodermic injection. In the operating room, 1/6 of pantopon by hypodermic is given, if necessary, and occasionally it may be repeated once or twice during a long operation, but no more scopolamin is given. For a child, only the first dose of scopolamin is used. Quite invariably the patient is in an unconcerned sleepy state as the local injections are started. Five c.c. of 3-percent novocain with 5 drops of adrenalin may be used for a modified Van Lint akinesia, a peribulbar injection, and possibly a ciliary ganglion injection. A 1½-inch stiff needle is inserted at the outer rim of the orbit and injection of the external canthus in preparation for canthotomy, if necessary, is made. The external rectus may be injected subconjunctivally at the same time. The needle is now pushed along the periosteal rim of the upper, outer orbit as far as the supra-orbital notch, injecting sparingly in order to avoid edema. The needle is withdrawn somewhat and passed retro-conjunctivally to the superior rectus within Tenon's capsule, which is injected as the lid is held up and the eye turned down, usually by the patient or perhaps with the assistance of a strabismus hook in the lower culdesac. The lower outer rim of the orbit and inferior rectus is injected from the same point of entry. The stiffness of the needle, about 21 gauge, permitting motion of its tip to be detected below the surface in loose tissue, is important. After this injection any of these recti tendons may be seized with a tenaculum while the peribulbar area over the sclera to be operated upon is injected, and the injection for mydriasis is given. Throughout these procedures, since no speculum is used, the cornea for the most part is kept hidden under the upper or lower lid.

animal eyes,[11] but Lindner, employing an Arruga speculum, showed that the same principle could be applied to the human eye during the operation. With the Arruga speculum one must usually also flatten the eyeball with a straight spatula in order to see the transilluminated scleral spot, which is about 2 mm. in diameter, at the best possible angle. To accomplish both these actions, a wedge-shaped speculum was devised (fig. 2) with straight slanting sidewalls, close enough together so that the sclera could not bulge into the speculum and hide the view at the bottom. However, it was often found difficult to mark the sclera with ink or the diathermy tip at the right moment because of moisture in the speculum depths. Therefore another instrument (fig. 3) was made of stainless steel, to hook into the sclera at the desired point and to remain in position while the eye was rotated and dried for diathermic or other marking. The hook is a fine (.005″) needle point of stainless steel or 20-percent iridium-platinum forced into a tiny slot sawed slantingly (60 degrees) into the narrow

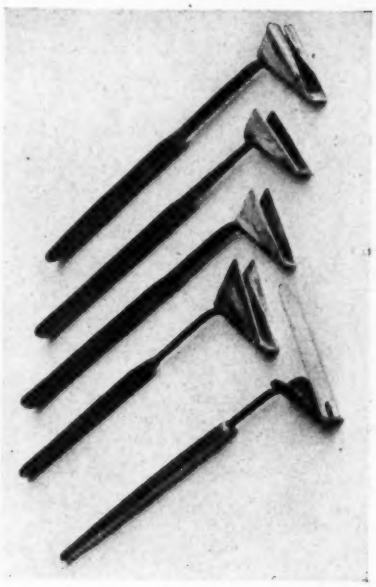

Fig. 2 (Walker). Hollow-wedge retractor speculum designed to retract tissues to orbital rim, at same time flattening the side of the eyeball, without permitting sclera to bulge into the speculum and obstruct the straight line of view.

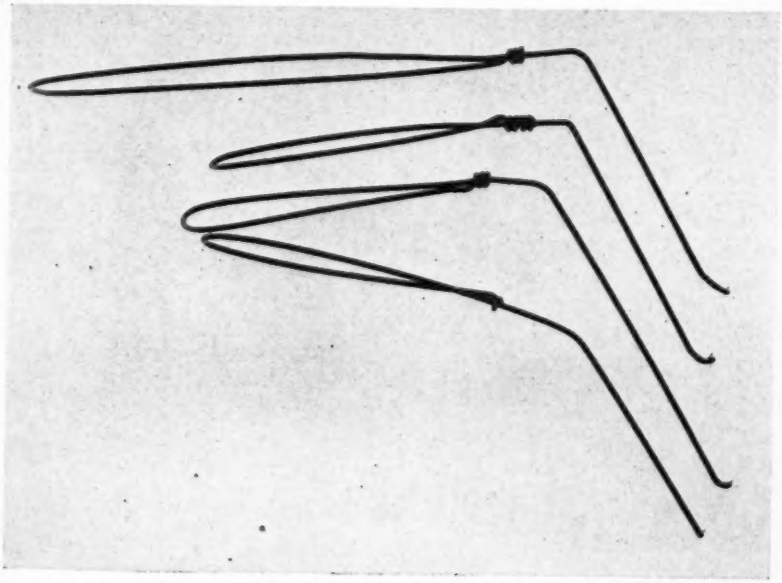

Fig. 3 (Walker). Beading-needle points set into stainless-steel shafts, forming straight slanting hooks 0.6 mm. long which accurately hold the center of the transilluminated spot until marked, without danger of puncturing the sclera.

end of the stainless-steel shaft, which acts as a stop for the needle at 2/3 mm. to prevent deeper penetration into the sclera. With the ophthalmoscope the movement produced by the hook is readily seen, when it takes hold in the transilluminated scleral spot behind the tear area under observation.

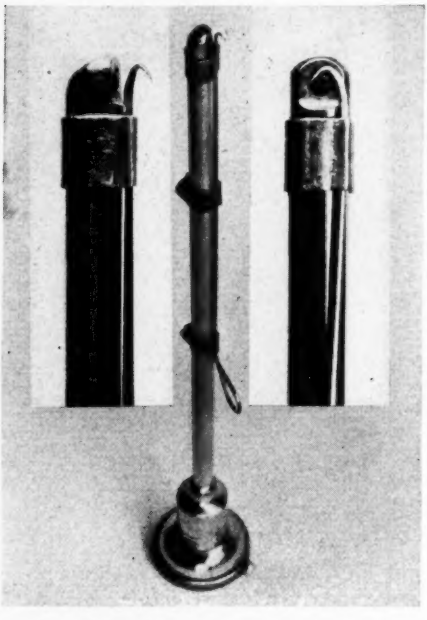

Fig. 4 (Walker). Periscope and plain-hook tenaculum attachment for deep transillumination localization.

The error due to light projection, throwing the tear location too far back on the eyeball, is reduced to insignificance for all ordinary tears, because the speculum and hook push the sclera closer to the tear during the process of transillumination. The accuracy is often such that the first tracer-bubble localization and treatment needle pass through the scleral mark directly into the tear area.

To use the transilluminating method still farther back and in the most difficult portions of the orbit, I have fitted a hook to the periscope tube of a nasopharyngoscope (fig. 4), so that it is curved around the lens window, lying flat against the rim of the window when being inserted behind the eye or under a muscle. When in correct localizing position, the red glow, visible to the assistant through the instrument when the window is in the center of the transilluminated scleral spot, reaches a maximum; then, under observation, the hook is turned against the eyeball by the assistant and lodged slantingly in the sclera. A hook-localizing periscope can be made* as small as 3 or 4 mm. in diameter, and will reach to the macular region with the minimal risk of tearing a ciliary vessel if this maximum penetration is required.

In addition to the usual localization by perimeter and screen calculations, a check test by transillumination is made in all cases before one proceeds to the final and most valuable localization with the tracer bubbles, or perhaps with the detachable tracer micro-needles. All three methods are used because of occasional difficulty in seeing the tears clearly at some stage, which may necessitate a return to the micro-puncture method. If loss of time or some unexpected event necessitates omission of any procedure, the transillumination localization is sacrificed first if the cornea is still clear.

Nondetachable needles

Vogt has not made many stipulations in regard to micro-needles, except to refer to them as "fine" or "very fine." My experience has indicated that the finest needle compatible with adequate strength is the best during the localization and most of the operation, because it softens the eye very slowly and re-

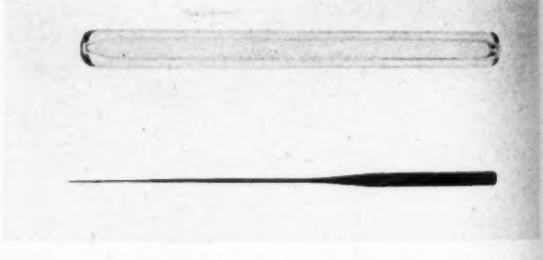

Fig. 5 (Walker). Undetachable micro-needle with depth stop.

* Electro-Surgical Instrument Company, Rochester, New York.

duces the bleeding from a punctured vessel to a well-tolerated minimum. The needle I prefer is .004″ or about 0.1 mm. in size; it is from one half to one third the diameter of the ordinary high-grade, fine epilatory needle at a distance of from 3 to 10 mm. from the point. The shafts of the epilatory needles taper throughout their lengths, and, as a result, under the same pressure they will stop in the sclera at a different depth under a muscle where the sclera is thin than where it is thicker.

If these needles are ground down to the desired condition of almost parallel sides, and from .005″ to .006″ in diameter, a stop can also be formed at any distance from 3 to 12 mm. from the point. Thus a set will be obtained of several different lengths from tip to stop (fig. 5); these can be placed in prepared tubular glass cells. The latter, in turn, are held firmly in spring receptacles, numbered as to length around the circumference of a

Fig. 6 (Walker). Container for undetachable micro-needle.

container (fig. 6) in such a way that the single opening in the rotary cover can expose only one needle at a time for removal, whereas all the others are prevented, by the unperforated portion of the cover, from slipping out of their cells. The entrance of each glass cell is fused into a smooth, rounded, dough-nut shape, so that the extremely sharp needle tip passes into the central opening with minimal, if any, dulling if it should touch the glass. Immediately after each operation, all used needles are carefully burnished and if necessary resharpened.

Fig. 7 (Walker). Detachable micro-needles .005″ to .012″ for localizing and treating with electrolysis.

Detachable tracer needles

Different lengths of 25-percent iridium-platinum detachable micro-needles (fig. 7) are sharpened in the same way and placed in a short flat container (fig. 8) involving the same principles as previously described for long needles. Detachable needles of iridium-platinum are very helpful when the operative field is too far back to allow of the perpendicular application of long needles, and also to determine the correct length of needle to use; for the detachable needle may be left *in situ* and is more readily seen than are hydrogen bubbles which must be brushed off by withdrawal of the needle, after which they may move a little, taking different positions according to the turgescence, viscosity, and fluidity of the vitreous. They may even float over a tear in such a way as falsely to simulate a treatment.

Further, a detachable micro-needle is very useful when, after several punctures and considerable bubble formation, one cannot be sure which bubbles are associated with each scleral puncture, so that the tear may be repeatedly missed and remain insufficiently treated. Then by putting in a detachable needle or two, one immediately knows almost exactly at what points to make other punctures which will complete the treatment. Thus used, the needles might be called "tracer needles."

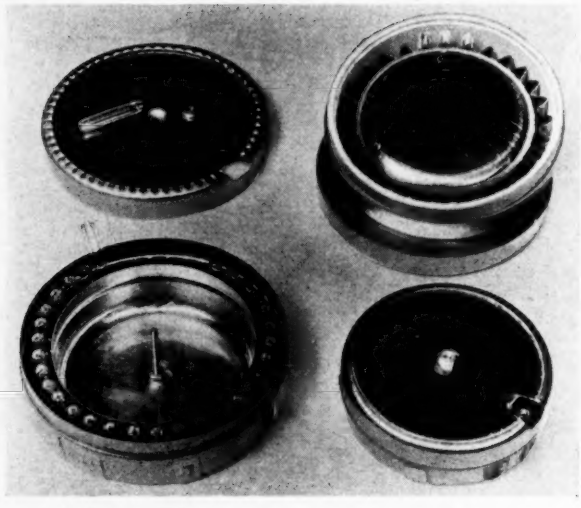

Fig. 8 (Walker). Container for detachable micro-needles.

Scleral needle-tooth forceps

There are many times when one would like to apply fixation forceps directly to the smooth sclera itself; sometimes because the eye is very soft to begin with, or becomes unexpectedly soft from leakage after numerous punctures have been made, although a large number of punctures still remain to be made, as, for example, in a case with several tears requiring extensive treatment. Figure 9 shows a needle-toothed scleral forceps with iridium-platinum needle-tips, fixed into sawed slots as described for the scleral hooks (fig. 3). They have been found quite indispensable in many situations, not only when the eye was too soft, so that it was necessary to hold the sclera up while puncturing in order to prevent distortion of the contents, but also at times to get more rotation or at other times to prevent rotary motion of the globe.

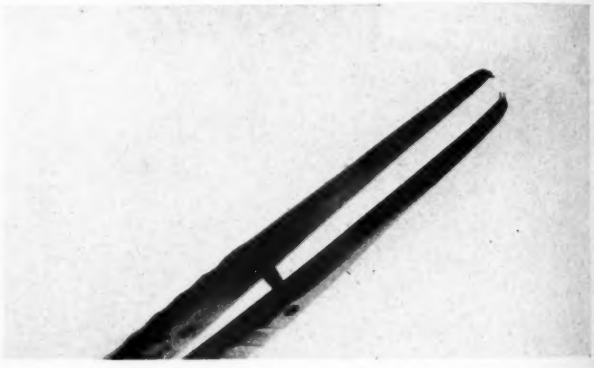

Fig. 9 (Walker). Some principle of needle tips as in figure 3, to mark a sclera with absolute firmness and accuracy and without injury.

Nondetachable platinum needles and control of needle breakage

I have frequently (six times in fifteen operations) broken steel epilatory needles while inserting them into thick tough sclera, but never while removing them. The mechanism of breakage seems to be the same in all cases. The line of force is different from the line of passage through the sclera. The needle should be passed through the sclera perpendicular to its surface and somewhat slowly, so that the shaft and the scleral passage may be kept in alignment. Since the point of breakage has never been at the hilt nor flush with the surface, but always between these two points as a result of sudden malalignment, the breakage has never resulted in complications. Breakage may also be avoided by changing to 25-percent iridium-platinum needles or by taking a series of short holds on the needle with the forceps. This procedure might be referred to as "stepping the needle in." The 25-percent iridium-platinum needles of .004″ but not of .006″ diameter often have to be handled in this way to prevent bending; at the same time the method limits the total time that the current is used to about one second at the end of the puncture with 0.9 M.A. current. I have also gold-soldered these fine tips of both steel and 25-percent iridium-platinum into the end of fine platinum hypodermic needles, also into the drilled or split ends of solid Monel-

metal rod to fit either diathermic or epilatory handle and also give a stop at a series of millimeter lengths. Glass containers for these are made with a thick-walled constriction about one-half inch from the lower end. The shoulder of the needle is held at the constriction, and below it the fine needle tip is protected without touching anything. The gold-soldered 25-percent iridium-platinum needle in Monel-metal shaft makes the safest, most practical form of nondetachable, noncorroding micro-needle at reasonable cost, to fit standard handles.

The trocar needle

Without soldering, but held in a pin chuck, an extremely fine (.003″ to .004″) 25-percent iridium-platinum needle may be prevented from bending and also be made adjustable as to penetrating length by means of a mechanism that moves it within, and protrudes it from, a tubular sleeve, after the manner of a trocar and canula. For instance, a sufficiently long needle, held in a pin-chuck which displaces the piston of a hypodermic syringe, may be made to fulfill the requirements with a 23- to 25-gauge stainless-steel hypodermic needle acting as the sleeve or canula. The usual sharp end of the hypodermic needle allows too much side opening. A special tip is formed, shorter and with two very sharp tips or spurs. These two sharp spurs, when pressed upon the sclera lightly, prevent any slipping while the trocar needle is making its puncture through the sclera and is drawn entirely out again. However, if the tip should accidentally slip and bend the needle, it can be straightened immediately with the fingers and, unless very acutely kinked, will continue to work as well as ever if sharpness has not been lost.

Although this device is still in crude form it performs the localization by tracer bubble and a major part of the treatment satisfactorily, because the sclera does not seem to lose fluid and vessels bleed scarcely at all when punctured with this extremely fine practically nontapering needle. The slight current loss from needle to canula does not in any way affect the meter reading but, on account of the diminished surface area of the needle, a full 1 M.A. for one second dose is used. None of these needles have ever broken even when severely bent.

Tracer-bubble localization

In order to strike the tear area and obtain definite scleral marks for the center of the tear opening, also to trace any extensions it may have, it is important not to allow the formation of an obscuring number of bubbles before the tear is satisfactorily localized. Softening of the eye should be combated in order to maintain relations; therefore, the needle should be very fine and the number of punctures used in localization should be as few as possible compatible with obtaining the definite scleral points desired. Accordingly, preliminary localization with perimetric calculation and transillumination checkup should be as careful as possible. I do not use Vogt's three preliminary punctures at the scleral mark for the tear, two proximal and one distal from the limbus, because I use direct ophthalmoscopy, whereas Vogt, using an inverted image, must avoid moving in the wrong direction. Also one or more of these three preliminary punctures may either fail to show because of incorrect needle length or current dose or may fall too far from the tear thus becoming wasted shots perhaps lowering the tension undesirably. When only one very fine needle puncture is made and observed at a time, I believe greater accuracy and efficiency are obtained with less chance of confusion.

Treatment under ophthalmoscopic observation

Although usually made in the form of a circle or loop, the unsharpened end of a detachable micro-needle may be altered to form an axle (fig. 10A) so that treatment in the tear area itself may be carried on under ophthalmoscopic observation, since the curved tip of the contacting handle member (fig. 10B) can impart a universal joint motion, with the sclera acting as a ful-

crum. Only if the needle is free in the tear area, and has not punctured the retina at any time, may it be moved under observation along the margins of the tear in any direction until the whole area, as well as the tear margins, has been painted with nascent hydrogen

second, 0.9 M.A.) puncture treatments were also made through the ground of the dialysis, but avoiding retinal puncture. This treatment resulted in a prompt reattachment of the retina, the return of a full field, and central vision attaining a quality equal to the ability

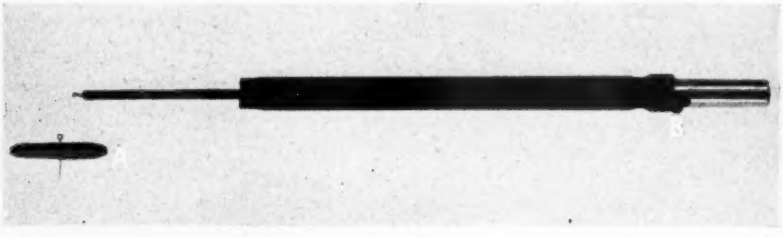

Fig. 10 (Walker). A. Right-angle axle-top detachable 25-percent iridium-platinum micro-needles are stepped through the sclera without bending or breaking. B. Electrode handle, loosely attachable to the axle-top needles in order to tilt them in any direction after they are lodged within the retinal tear, at the same time supplying current while the wedge speculum and ophthalmoscope are used to observe the actual motion and treatment.

bubbles and their equivalent of NaOH. This procedure was carried out successfully on two quite similar cases, one of which may be briefly recounted as follows:

Unusual test cases

Miss D. K., No. 196-079, Los Angeles General Hospital, aged 27 years, with myopia of 10 D., about two months previously while stamping about the house in a terrible temper, began to see spangles of light; vision failed in the right eye from above downward. Vision upon admission was reduced to 1/200 with only a small patch of field below and a large central scotoma. Tension was 13.5 mm. Hg (Schiötz). Ophthalmoscopically the eye presented a typical picture of peripheral dialysis below, with hole in the macula also. The latter was treated by the Lindner undermining and 3-percent KOH (1/50 c.c.) injection method but the area of dialysis was loaded with the products of catholysis (0.9 to 1.0 M.A. for from five to seven seconds) by waving three different 7-mm. needles distributed in the tear area back and forth under observation along the retinal margin and throughout the ground of the tear area, which involved 74 degrees of the lower temporal quadrant. Forty-eight (one to read typewriting. Distance vision corrected was 20/70—. At this writing, six month after operation, there has been a slight improvement and no setback in any respect. Pinhole goggles are still being worn.

Comment: The result in this case could be interpreted as indicating that actual puncturing of the retinal margins was not so necessary as choroidal treatment and especially the concentration of NaOH in the condensation membrane between the vitreous and the intraretinal fluid. Perhaps this, together with cauterization of the retinal margins, promoted a contraction of the condensation membrane, and intraretinal fluid, possibly resulting from pH alteration, which inhibited the flow of aqueous or fluid vitreous through the tear and promoted closure of the tear, led to a permanent cure. Thus a large disinsertion and a macular hole were repaired by the use of both nascent and 3-percent alkali treatment.

A consideration of the sequence in this case suggests, it seems to me, that the same reattachment result might be obtained if the correct amount of alkali could be properly injected with an extremely fine hypodermic needle, so as to form a certain properly concen-

trated layer of alkali on the condensation structure between the vitreous and the intraretinal fluid, in the areas of retinal discontinuity, and also on the corresponding choroidal area, as well as in the intervening intraretinal fluid. In experiments with special needles and devices for this purpose I find that there are many difficulties to overcome before the treatment is practical.

In the case just recorded it may be noted that no effort was made to obtain drainage of the intraretinal fluid other than that secured with the aid of the fine needles. This was due to the fact that in a patient previously operated upon, I had tested, in the following procedure, what might be expected by way of choroidal absorption of fluid after closure of tears.

Mrs. C. L. M., No. 163-718, California Hospital, aged 57 years, with myopia of 5 D., was referred by Dr. J. W. Avery of Hollywood, California. The lower half of the right fundus was occupied almost completely by a huge, fluctuating, bullous separation with no visible tear. Vision equaled shadows only. Tension was 13.5 mm. Hg (Schiötz). The duration of the impairment was about six months, having begun with a hemorrhage that obscured the fundus for two months. There was no history of injury, but central vision was known to be less than normal because of a "black spot in the back of the eye." The upper fundus had become sufficiently reattached to give a field of vision with large test objects, although three ordinary triangular tears, from one-half to one disc-diameter in size, were distributed in the shallow separation from the equator toward the ora between 90 and 127 degrees in the upper temporal retina. These tears were closed with 38 punctures, producing very little drainage, using 0.7 to 0.8 M.A. current for a little over one second each. It was planned to drain the lower fundus at a second operation. At the first dressing, however, 36 hours later, I was surprised to find the fundus clear, the field full (tested roughly), vision 6/200 without correction, and no traces of detachment or subretinal fluid present even in the lower quadrant of the eyeball, which had been full of fluid before operation and had received no treatment. At present (seven months after operation) vision equals 20/200 and there is a full field except for central scotoma due to a pigmented macular degeneration known to have been present before the operation.

Comment: In one other case of this type an examination at the end of 24 hours showed that the intraretinal fluid had been absorbed and that the fundus reflex, field, and vision were very good, with every appearance of a reattachment. However, while searching for the minute appearance of the tear area, a blurring change in the vision as well as in the fundus picture suggested that the ocular movements during examination may have been responsible for the redetachment observed later, and cured by a second galvanic operation. Since then I have not asked the patient to move the eyes or open the lids, if there is no pain or discharge, until at least 48 hours after the operation.

These cases, which seemed to be worse in some ways than those described by Vogt,[6] gave evidence on which to make a still more thorough test of the method in the following case of severe trauma:

Mr. C. R. S., No. 164-493, California Hospital, aged 40 years, and emmetropic, was referred by Dr. L. Grey of Shreveport, Louisiana. Two months previously the patient had been struck on the right temple by a falling iron bar, but the eye was not directly injured. Separation of the retina occurred, exhibiting a zone of almost innumerable dehiscences in the upper temporal quadrant, together apparently with a sizable, one-half disc-diameter tendency to incomplete hole formation at the macula, with a hinged-lid appearance. Tension was now 15 mm. Hg (Schiötz). Vision was 10/200 eccentrically, the field limited to the upper temporal quadrant. The upper portion of the macular area, representing the hinge of the lid, was wrinkled, but without the turned-up lamellalike edge found elsewhere around the tear. The lower margins were ragged and curled forward. The zone of fine, lacelike

holes was estimated to extend 2.5 mm. behind the equator, near the horizontal meridian, and only 0.5 mm. back at the vertical meridian. It averaged 24 degrees in width, and contained three areas—one in the center and one at each extremity—in which the multitudinous holes were confluent to form larger holes—from one-quarter to one-half disc-diameter—with the shreds of the retinal net still tending to form latticework irregularily across them. The largest hole toward the horizontal line had two small vessels bridging it in cross formation almost at its center, with minute shreds of retina still adherent to them, resembling closely Vogt's illustration,[6] in which, however, only one vessel crossed the ground of the tear.

The patient was given a very guarded prognosis by any method of treatment. Vogt's procedure was chosen because it was believed that the latticework of the retina available in the damaged zone might serve as a good structural framework for repair by catholysis. Our modification of Vogt's method was used, as it was considered to be the least traumatic for the first operative effort. However, the area would require almost twice as many punctures as I had ever used or had any knowledge of having been used. Seventy-one was the highest previous number of punctures employed in which a reattachment was obtained. In this case 126 punctures were necessary properly to load the tear zone with bubbles. The macula was first treated by alkali injection, after an undermining in the direction of the orienting line I have described, to align —(1) the upper cornea; (2) the upper end of the attachment of the external rectus; (3) the trephine opening above the middle of the inferior oblique attachment, and (4) the macular area. As this was done through a temporary tenotomy of the superior rectus, the cornea was protected under the lower lid so much of the time during the 2¾-hour operation that it was kept very clear for ophthalmoscopy. Excellent anesthesia was obtained hypodermically, so that no drops were used on the cornea except a little normal solution, which was flushed on just before each examination with the ophthalmoscope. During the operation the necessarily frequent use of the ophthalmoscope to ascertain that every part of the hole-bearing retina received proper treatment consumed much time. However, many of the smallest holes must have escaped central needling.

At the first dressing, 48 hours later, I was astounded to find the retina completely reattached, with only slight remnants of the preoperative picture of multitudinous holes visible through a clear vitreous. The eye was only slightly inflamed, the field, by confrontation test, was fully expanded, and with a +3.00 lens the patient could distinguish typewritten letters. On June 1, 1935, after the first week out of bed and four weeks after the operation, no evidence of any setback had appeared. No portion of the operated-on area of the retina showed any deviation from the appearance of a "cured" case. No setback has been experienced at present writing, six months after operation. The tension is 17 mm. Hg (Schiötz), vision 20/50, and ordinary newsprint is read with a +3.00 lens.

General comment

The difficulty of seeing on the sclera the site of the tiny hole made by the finer needles is best overcome during the operation by use of either a strong sterile hand lens or with binocular magnification. However, after a considerable number of punctures if an area still requires more treatment, it may be difficult, because of copious bubble formation, to coördinate the area with surface markings. Such an area may be repeatedly missed, unless a detachable needle which can be clearly seen even through the bubbles is used to reorient the inside bubble pattern with respect to the outside puncture pattern.

Another illusion may occur when bubbles drift over a tear or are deposited over a tear by a needle coming through the retina at some distance from the tear, perhaps slantingly with respect to the torn area. Although apparently laden with bubbles the tear has not been sufficiently treated, because the needle did not pass through

it nor its immediate margins. Here again a detachable needle will quickly reveal the true relations. It may also show up an error, owing to the magnification of about fifteen times by the ophthalmoscope as compared with the ordinary magnification of perhaps two by the binoculars, if these are used to observe the corresponding scleral pattern of puncture holes. If insufficient reduction is made in estimating the distance to the next scleral puncture, the hole in the retina may be repeatedly overshot. Occasionally, in this case, a new puncture need not be made but simply a change in direction of the needle with respect to the sclera.

Sometimes a retinal hole, less than a disc-diameter ophthalmoscopically and represented by a scleral area possibly no greater than a square millimeter, makes enough side slip with respect to the sclera, when the latter is indented and distorted by the needle pressure, so that no definite central puncture, proved by presence of bubbles, is made, yet a cure may nevertheless result, perhaps by alkali drift from the marginal treatment. On the other hand, a failure may result with the same picture, especially if the tears are multiple, a little larger, and badly distributed, as for example, one tear under the external rectus, one in the upper nasal quadrant, and one under the internal rectus, with perhaps, also a macular hole.

However, in general, it may be said that the galvanic method accomplishes its results with less reaction, less scar formation and vitreous opacification than is possible with the diathermic methods. Nor does the galvanic method seem to lag noticeably in percentage of reattachments at the first operation when there are only two or three medium-sized tears not badly situated nor accompanied by an excessive number of satellite dehiscences. Because these primary cures are of a high quality and because when failure occurs a second operation by any method is not so difficult as when following a diathermic operation, the galvanic operation under the best conditions is a method of first choice, except when a tear is two or more disc-diameters in size. Yet a disinsertion below, involving a whole quadrant together with a macular hole, in a young person with myopia, has responded perfectly to the treatment.

Statistical summary

In reviewing a group of the first 17 completed cases with no further operation proposed, treatment by catholysis alone or with a small additional amount of micro-puncture diathermy (three cases) at the first operation, and with more diathermy and little or no catholysis for the secondary operations, there have resulted 15 reattachments with satisfactory field and central vision, with no secondary redetachments during the last 10 months. This would indicate a possibility of cure as high as 88.2 percent. However, in such a small series, the high percentage of success may not be particularly impressive even though some very difficult cases are included in the group. The influence of the galvanic method in contributing to these results may be tempered by other factors, such as increased experience on the part of the operator, especially the enforced increase of careful intraocular observation.

Nevertheless, one feels inclined to believe that when the first operation is by catholysis and fails, the eye is left relatively less traumatized and in relatively better condition for further operation by any method, so that the real statistical advantage occurs in the cases requiring a second operation. For instance, if we consider the number of reattachments resulting after the first operation, using only pure catholysis, we find 10 primary reattachments among 16 cases, or 62.5 percent. But the six failures (there having been no severe reactions, the media being practically as clear as before and with very slight scar-tissue formation) still offered a 66-percent chance of success in secondary operations. In two of these failures catholysis was tried a second time and was successful once. This second failure by catholysis was cured by diathermic micro-puncture, which was also used in the other failures, usually because the tears were of larger size than 1½ disc-diameters.

The additional placement of a single barrage of diathermic micro-pins around large tears has been helpful if these are not allowed to touch the retina. Adding three cases in which this was done to the above 16 cases of pure catholysis, the percentage of primary reattachments improves to 68.4. In such instances the micropins have been put in first before any punctures have softened the eye, and my curved type[11] of pins, which stick most firmly and flatly to the sclera, permitting the least risk of fluid loss and not projecting toward the retina, have been most frequently used. Within this barrage, the catholysis was carried out as usual. Then other smaller holes elsewhere, outside the barrage line, were carefully traced out by catholysis.

Conclusions

1. An attempt to evaluate the possibilities of closing retinal tears by electrolytic alkali, by catholysis as described by Vogt, has confirmed his statements in practically every detail after 15 operations modified from Vogt.

2. Every type of case (except the case illustrated by figure 6) described by Vogt[6] has been observed, and three separated retinas, perhaps more extensively damaged than any included in the above report, are briefly recorded here.

3. The upper limit of alkali treatment by catholysis was not proved, although it was believed that a record was set when 126 micro-needle cathode punctures of about one second terminal duration, carrying an average of .85 M.A. of current on a .006″-diameter needle penetrating 7 mm., were used with every evidence of success. Also 1/50 c.c. of 3-percent KOH was injected subchoroidally at the macular region in the same eye. (Recently 168 micro-needle punctures for tears involving over half of the eye, were well tolerated, and resulted in improvement but not a cure.)

4. However, failure occurred in a case with a traumatically torn hole in the retina, from two to three times the size cited by Vogt, extending centrally 45 degrees from the macula. But in two cases a large 70- to 75-degree dialysis below, also with a macular hole, was reattached, with excellent field and vision, both in a myopic eye and in a case of traumatism.

5. Indications point to the fact that perforation of the retina is not necessary in all cases, although it is often unavoidable by micro-needle galvanic alkali treatment (catholysis).

6. An extremely fine (.003″) micro-needle supported, or trocar type of 25-percent iridium-platinum, has important characteristics as regards inhibiting leakage and bleeding.

7. Detachable micro-needles may be used to treat more posterior areas, but they are especially valuable to relocalize in case of deceptive tracer bubbles and scleral coördination.

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THE HISTOPATHOLOGY OF PARINAUD'S CONJUNCTIVITIS

HARVEY D. LAMB, M.D.
SAINT LOUIS

The clinical and histologic findings in two cases of Parinaud's conjunctivitis are presented. In both cases the microscopic changes, including the demonstration of the leptothrix, strongly support the conclusions of Verhoeff for this disease. From the Oscar Johnson Institute of Washington University School of Medicine.

Anything like a complete review of the literature on Parinaud's conjunctivitis is impossible in a short paper, so numerous have reports become. Löhlein[1] in 1928 discussed in outline the more significant findings of writers on the histopathology of Parinaud's conjunctivitis. In the original article of Parinaud[2] in 1889, the condition was called an infectious conjunctivitis, transmitted by animals. The author himself recognized that the differential diagnosis from tuberculosis of the conjunctiva could be difficult. That the process was of a tuberculous nature was reported by Hoor[3] in 1906, who stated that a pseudotuberculosis or an animal tuberculosis was present. Rupprecht and Wölfflin,[4] Adam and Wätzold,[5] and Re[6] found tubercles in the excised pieces of conjunctiva affected by Parinaud's disease; the second pair of authors found several tubercle bacilli. In addition, Wessely,[7] Adam, and Meisner[8] showed by direct inoculation from the involved conjunctiva that a bovine tubercle bacillus had caused the infection. Pereyra[9] and v. Herrenschwand[10] cultivated pseudotuberculosis bacilli from the conjunctiva. Bayer,[10] associated with v. Herrenschwand in this study, accidentally inoculated his own conjunctiva with the Bacillus pseudotuberculosis rodentium and produced the typical picture of Parinaud's conjunctivitis. Although the tuberculous etiology thus appeared probable in Europe, nevertheless Morax[11] and Purtscher[12] objected to such generalization and insisted that no case should be designated as Parinaud's conjunctivitis that showed tuberculosis histologically or by inoculation. As recent as 1928, Tomassene[13] of West Virginia, reported acid-fast bacilli in the brokendown preauricular and cervical glands and tuberculosis in a guinea pig injected with curettings from the conjunctiva of a patient with Parinaud's conjunctivitis. Löhlein, himself, considered Parinaud's conjunctivitis to correspond with an attenuated tuberculosis of the conjunctiva; he nevertheless admitted that cases of Parinaud's conjunctivitis had been repeatedly reported, in which the histologic study afforded no justification for a diagnosis of tuberculosis.

Among the latter variety, must next be mentioned a series of 56 cases, having a similar histologic picture. The first of these was reported in 1905, by Verhoeff and Derby.[14] Verhoeff[15] in 1913 modified the technique of Gram's stain and demonstrated groups of a fine threadlike organism or leptothrix in the conjunctivae of 11 patients. In 1918, Verhoeff[16] reported the presence of the same organisms in six more cases of Parinaud's conjunctivitis. Again, in December, 1931, at the meeting of the New England Ophthalmological Society, Verhoeff[17] stated that the leptothrix had been found in all 43 cases of the disease observed at the Massachusetts Eye and Ear Infirmary. Verhoeff and King,[18] in 1933 reported in three cases the successful cultivation of this organism on dextrose-serum agar and in serum-agar in jars in which 10 percent of the air had been replaced with carbon dioxide. At Boston, in the interval during which 45 cases of Parinaud's conjunctivitis had been encountered, there had been observed only 13 cases of conjunctival tuberculosis.

Of other reports describing cases of Parinaud's conjunctivitis, having a similar histologic picture and characterized by the leptothrix that Verhoeff discovered, there have been seven, not including the present two. Bernheimer[19] in 1906 described the same composition of the tissue in a single case, Keiper[20] in 1913 reported two cases with similar histologic pictures and Verhoeff's lepto-

thrix. Connell[21] in 1916 published similar microscopic findings in one case. Wherry and Ray,[22] in 1918, studying a single case of Parinaud's conjunctivitis, excised no tissue but aspirated pus from the swollen preauricular gland. The latter material, injected subcutaneously into a white mouse, produced an infection, after 4-5 days, characterized by purulent conjunctivitis and death. From muscular abscesses, observed at autopsy, a leptothrix was cultured on slants of egg-yolk. Later the leptothrix was isolated on egg-yolk under anaerobic conditions, directly from the preauricular gland. Lemoine[23] in 1924 reported one case with the microscopic tissue changes and leptothrix of Verhoeff. Dunphy[24] published similar findings in two cases in 1926, as did Gifford[25] in 1927.

Accordingly, during about the last 30 years, Parinaud's conjunctivitis has been considered by some writers to resemble a tuberculous infection and by others to be due to Verhoeff's leptothrix. The infectious necrotic conjunctivitis of Pascheff and the conjunctival involvement in tularensis differ, clinically, as well as bacteriologically, from Parinaud's conjunctivitis.

Verhoeff's[16] description of the histologic changes in the conjunctiva affected with Parinaud's conjunctivitis follows: "The essential lesion is a focal area of cell necrosis, 0.3 mm., or larger in diameter, situated just beneath the surface epithelium. The focal area is densely packed with endothelial leucocytes, loaded with broken-down chromatin granules." In referring to the process in these foci as being one of necrosis, Verhoeff has explained that he does not mean to convey the impression that a necrosis similar to that in tuberculosis occurs. Here, many of the phagocytes show various stages of necrosis, the resulting cell-detritus being taken up by the newly arrived phagocytes. In the older cases, there is observed a considerable number of pus cells, in addition to the endothelial phagocytes in these foci. Surrounding the areas, the tissue in all the cases is densely infiltrated with chronic inflammatory cells; among the latter, plasma cells largely predominate.

Case 1. M. V., a female, aged 12 years, was a patient of Dr. John Green, who supplied the clinical history. She had been under observation in 1926 for recurrent styes. A moderate hyperopia was found for which glasses were prescribed. On January 21, 1931, she appeared at the office with considerable swelling of the left upper and lower lids accompanied by moderate discharge. Under simple measures (boric acid douche, boric ointment and cold packs), there was great initial improvement, so much so that on the 22d the mother telephoned that as the child appeared to be well on the road to recovery, she would not bring her to the office. Shortly after this, however, the lids began to swell again, accompanied by pain and discharge. She reappeared January 28, 1931. Both lids were found to be greatly swollen together with enlargement and tenderness of the left preauricular gland. On everting the upper lid a large pultaceous mass was seen in the upper fornix. Diagnosis: Parinaud's conjunctivitis.

On the following day the mass was excised and submitted to Dr. Harvey D. Lamb.

The child appeared to be ill; the temperature, however, was normal. She was referred to the family physician with the request that a blood count be made. This was done by Dr. Hollis N. Allen, who, on February 6, 1931, submitted the following differential count: stabs 16 percent; segmented 28 per cent; eosinophils 4 per cent; basophils 0; lymphocytes 50 percent; monocytes 2 percent. He added the following comment: "The smear shows a very evident leukopenia. This is much the sort of thing we have seen a great deal since the onset of the present influenza epidemic."

Local treatments consisted of silver-nitrate solutions in various strengths from 0.25 percent to 1 percent, copper-sulphate crayon, and on one occasion, an ointment containing holocaine and hyoscine. On February 17, 1931, great improvement was noted, the conjunctiva having smoothed out and the swell-

ing of the preauricular gland having subsided. A small granulomatous mass was clipped off on February 21st.

Inquiry as to animal contacts revealed the fact that the child had played with a cat, dog, rabbit, lizard, and chameleon. She had also handled a coon skin and squirrel tails. There was no history of contacts with horses or cows.

Microscopic findings: Sections of the excised piece of tissue showed a hyperplastic process. The surface epithelium was generally absent, but in a short length showed edema within and between the individual cells. The hyperplastic inflammatory tissue was really a form of granulation tissue with a secondary partial necrosis in the superficial portion. Lying in a medium of albuminous fluid, there were observed diffusely scattered numerous small lymphocytes, plasma cells, macrophages, and young fibroblasts. In the periphery of the tissue, lay dense numbers of fibroblasts with bizarre-shaped nuclei. The partially necrotic focus was extensive and presented numerous nuclear fragments, macrophages, pus cells, and small focal hemorrhages; many of the macrophages were filled

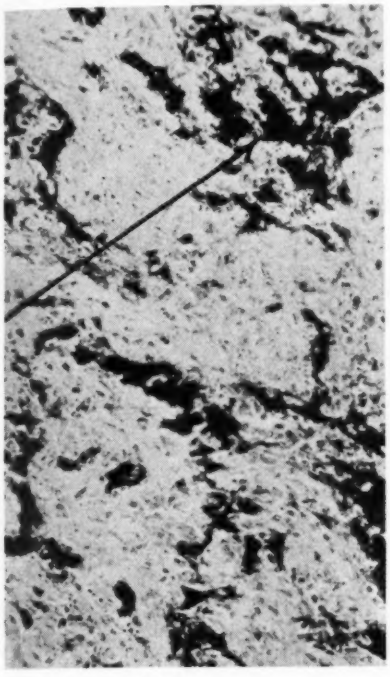

Fig. 1

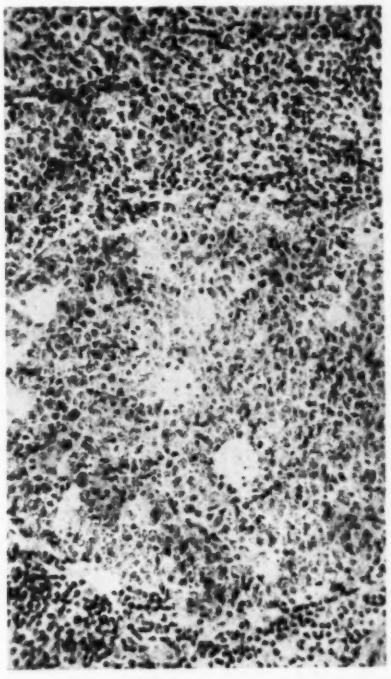

Fig. 2

Fig. 1 (Lamb). Section through conjunctival tissue in first case with Parinaud's conjunctivitis, showing groups of Verhoeff's leptothrix, as demonstrated by Verhoeff's modification of Gram's stain.

Fig. 2 (Lamb). Section through conjunctival tissue in second case of Parinaud's conjunctivitis, showing large group of macrophages with nuclear fragments, surrounded by generally diffuse small round cells.

Recovery was complete on March 7th, about six weeks after the first symptoms were noted.

The excised small specimen was fixed in formalin, imbedded in paraffin, and the sections stained with hematoxylin-eosin. For demonstration of Verhoeff's leptothrix, the paraffin sections were mordanted in Zenker's fluid and stained according to the modification of Gram's stain, discovered so very cleverly by Verhoeff.[15, 16]

with large and small nuclear fragments. Various-sized groups of the leptothrix of Verhoeff were present in large numbers, irregularly scattered through this partially necrotic focus. These groups of the organism were very irregular in shape; in them, the individual small straight filaments were very densely congregated. The small dots along the course of the short unbranched filaments were plainly visible.

Case 2. Mrs. F. L., aged 29 years, white, consulted Dr. Carl Beisbarth, who supplied the clinical history, on November 1, 1934. For two weeks she had noticed a lump in the lower lid of the left eye which gradually grew larger. About one week after the lump was first noticed, swelling began below the left ear and on the face in front of the left ear. The eye became red and there was some muco-purulent discharge. Hot packs had been applied to the swollen glands and a salve had been used in the eye. There had been an increasing amount of pain in the area in front of the ear.

Upon eversion of the lower lid, an elongated lump of considerable size was seen to be lying in the lower fornix. The lump was elevated so that it appeared to be on an elongated pedicle. A tentative diagnosis of Parinaud's conjunctivitis was made. The temperature was 99.4°F. and the patient felt ill generally.

The lump was excised after a novocaine injection beneath it, and the specimen sent to Dr. Lamb.

A careful history indicated that there had been no contact with rabbits nor house pets. The patient was the wife of a butcher and resided on the second floor of the store building above the butcher shop. She stated that she occasionally did some work of a clerical nature in the shop but did not handle meats.

After excision of the lump, the eye was bandaged and the patient was asked to return the following day. Aspirin was advised for the pain. The next day, the eye and lids were less red and very little discharge was present, but the swelling in the cervical and preauricular glands was more marked. Severe pain was present.

Laboratory reports at this time were as follows: Leucocyte count 10,500; Schilling, basophiles 0; eosinophiles 4.0 percent; myelocytes 0; Young 0; "stabs" 13.0 percent; segmented 65.0 percent; lymphocytes 19.0 percent; large mononuclears 8.0 percent.

Agglutination tests for tularemia, typhoid, and undulant fever were negative.

The eye became whiter each succeeding day but the pain and swelling of the glands increased until on November 8th, one week after excision of the lid mass, it seemed likely that the glands would "break down" and require incision. Allonal tablets, codeine, and aspirin were needed to control the pain throughout this period. On November 13th, the swelling began to subside and the pain became less. It was not until November 26th, that the face appeared symmetrical again. This was over three weeks after the removal of the lid growth and about six weeks after the disease was first noticed.

The elongated piece of tissue from the conjunctiva, fixed in formalin, was given the same treatment as that in the first case and the sections similarly stained.

Microscopic findings: In this specimen, the surface epithelium was generally well preserved. The individual epithelial cells showed irregularly arranged edema and cystic degeneration. The infiltration with chronic round cells was everywhere very dense. These infiltrating cells were mainly plasma cells, particularly deep from the surface epithelium. Macrophages were diffusely scattered almost everywhere. They became very numerous in and near the foci of partial necrosis. A short distance from the surface epithelium, several foci in an early stage (partial necrosis) were present in which were congregated dense numbers of macrophages with many nuclear fragments derived from them. Many other macrophages had taken up these nuclear particles and were found to be densely packed with them. Strikingly unlike the great number of large groups of Verhoeff's leptothrix in the first case, the clumps of the organism here were all small and infrequent in the foci of cell degeneration.

The filaments, however, were entirely similar to those described by Verhoeff.

Summary

The clinical reports and histologic findings with the presence of Verhoeff's leptothrix are described in two cases of Parinaud's conjunctivitis. In both cases, an eosinophilia of 4 percent was found.

640 S. Kingshighway.

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MASSIVE RETINAL FIBROSIS IN CHILDREN

ALGERNON B. REESE, M.D.
NEW YORK

The author has encountered several cases characterized by a grayish-white mass protruding from the retina in young individuals. In three instances these could be proved to be due to the organization of hemorrhage occurring at birth, or from trauma after birth. Those that occurred at the time of birth were due to the same predisposing factors which produce the analogous condition of intracranial hemorrhages in the newborn. The fundus picture resembled that of retinoblastoma from which it must be differentiated. The clinical and pathological relationship of this condition to metastatic ophthalmia, Coats's disease, retinitis circinata, and disciform macular degeneration is pointed out. From the Department of Ophthalmology, Columbia University. Cases 1 and 2 were from the service of the Eye Institute, case 3 was made available through the courtesy of Dr. D. H. Rhodes. Read before the American Academy of Ophthalmology and Otolaryngology at Cincinnati, September 17, 1935.

We have encountered several cases characterized by the protrusion of a grayish-white mass from the retina in young individuals, due to the organization of hemorrhage occurring at birth or from trauma after birth. The fundus picture resembles that of a retinoblastoma, from which it must be differentiated. The nature of three of the cases can be proved rather conclusively, and these will be reported in detail.

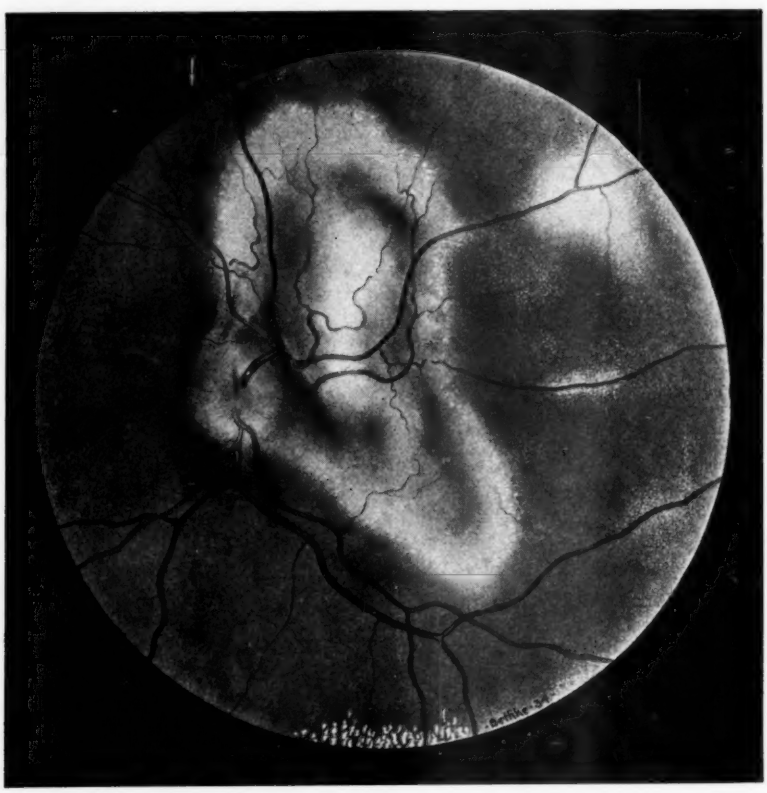

Fig. 1 (Reese). Fundus drawing, case 1.

Report of Cases

Case 1.

History: A boy, aged 6 years, had normal vision in both eyes at a routine school examination in September, 1931.

A few days later he was struck by an automobile and received a laceration over the left side of the forehead, and the left eye was bandaged. No examination of the eye was made at that time. One year later, in September, 1932, at a routine school examination, poor vision was noted in the left eye.

Clinical Examination: The vision of the right eye, with correction, was 20/40; of the left eye, 2/200. The iris of the left eye was somewhat darker than that of the right eye. The fundus examination of the right eye was negative. In the left eye there was seen adjacent to the disc, temporally, an elevated yellowish to grayish-white mass (fig. 1) about two disc diameters wide and six disc diameters long, with the long axis vertically placed. The retinal blood vessels coursed over the elevation and a few new-formed vessels, or dilated capillaries, were seen over the surface. The margin of the lesion was irregular in contour and fairly sharply demarcated by a lighter border in which were many punctate white dots. Identical dots were noted elsewhere over the fundus with a tendency to accumulate in foci. They were particularly large below in the periphery. No vascular changes of note were present. The disc was red and its margins indistinct.

The lesion was observed over a period of a year, during which time it was thought to have become more extensive, and enucleation was advised because of the possibility of retinoblastoma.

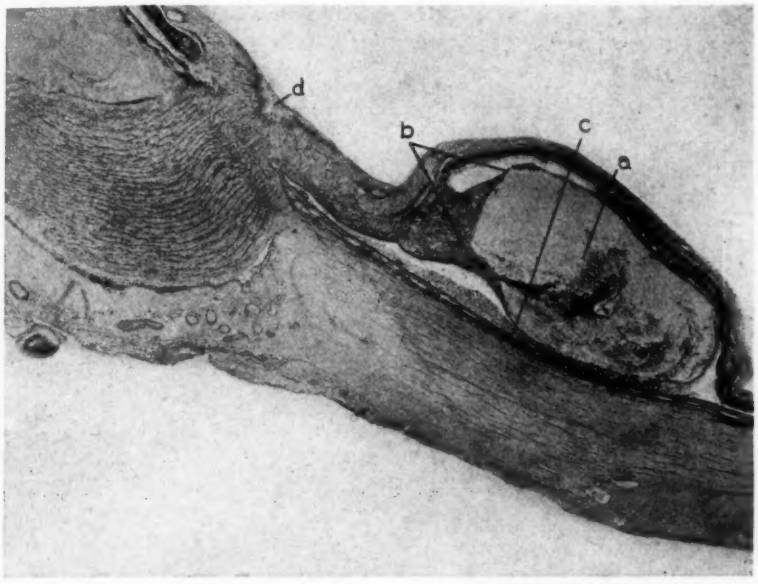

Fig. 2 (Reese). Microscopic section, case 1: a, dense fibrous mass throughout which are areas of pigment; b, neuroglial capsule; c, proliferated pigment epithelium; d, disc with physiologic cup bridged by fibrous membrane.

The physical examination was entirely negative. A Wassermann reaction was negative. Calcium could not be demonstrated in the globe by roentgenogram.

Microscopic Examination: On the temporal side of the disc was a large fibrous mass which extended from the external retinal layers into the subretinal space (fig. 2a). It was sharply demarcated and composed of dense, fibrous tissue, the nuclei rather sparse. It was surrounded by a neuroglial capsule which was particularly thick at the nasal borders (fig. 2b). Two types of pigment were noted in the lesion. One consisted of phagocyted pigment granules from the pigment epithelium and the other of amorphous crystals which

gave a positive Perl stain for hematogenous pigment. An occasional lymphocyte was noted. The overlying retina was adherent over most of the internal surface, though a flat detachment was noted in the nasal periphery. The underlying pigment epithelium had proliferated into excrescences and many free cells which formed a layer under the lesion (fig. 2c). The retina contained cystic spaces in its various layers. Most of them were divided into subdivisions by delicate septa which seemed to be the walls of fat cells. Some were filled with foam cells resembling the embryonic type of fat cells. Others contained a faintly eosin-staining homogeneous fluid. The optic disc was somewhat edematous, and bridging over the physiologic cup was a fibrous membrane (fig. 2d). At the nasal side of the disc there was a hyaloid excrescence of the lamina vitrea. The choroid was not materially changed in the vicinity of the retinal lesion or elsewhere. The anterior sector of the globe appeared to be normal.

Remarks: The white dots noted over the fundus with the ophthalmoscope represented cystic spaces in the retina filled with fat or an albuminous fluid. The indistinct margin of the disc was due to a fibrous membrane over its surface bridging the physiologic cup.

Case 2.

History: A boy, aged 5 years, had been blind in the left eye, so far as the parents knew, since birth. Forceps were used to aid delivery. Inflammation had never been noted in either eye.

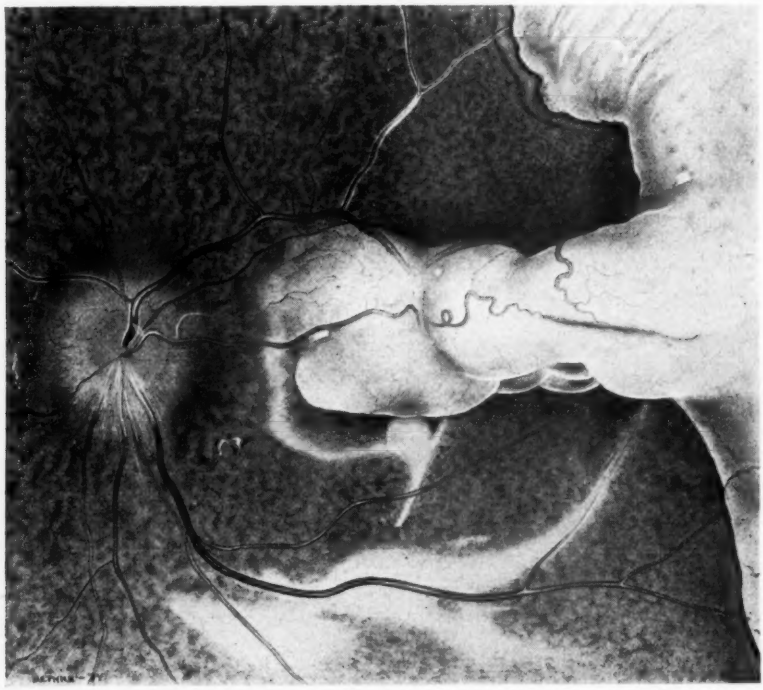

Fig. 3 (Reese). Fundus drawing, case 2.

Clinical Examination: The vision of the right eye was 20/30; of the left eye, hand movements. He could not fix with the left eye, which diverged 35 degrees.

The fundus of the right eye was negative; in the left eye, just temporal to the disc, was an elevated grayish to yellowish-white mass (fig. 3) with the long axis extending temporally in the horizontal meridian. The mass branched upward and downward forming roughly the letter "T." Retinal vessels coursed over its surface and around

the base were either some new-formed vessels or dilated capillaries. Some of the vessels in the vicinity of the mass showed perivascular white streaks. Below the mass was an irregular, white, flat area apparently lying under the retina.

After four months the lesion had apparently progressed and enucleation was advised because of the possibility of retinoblastoma.

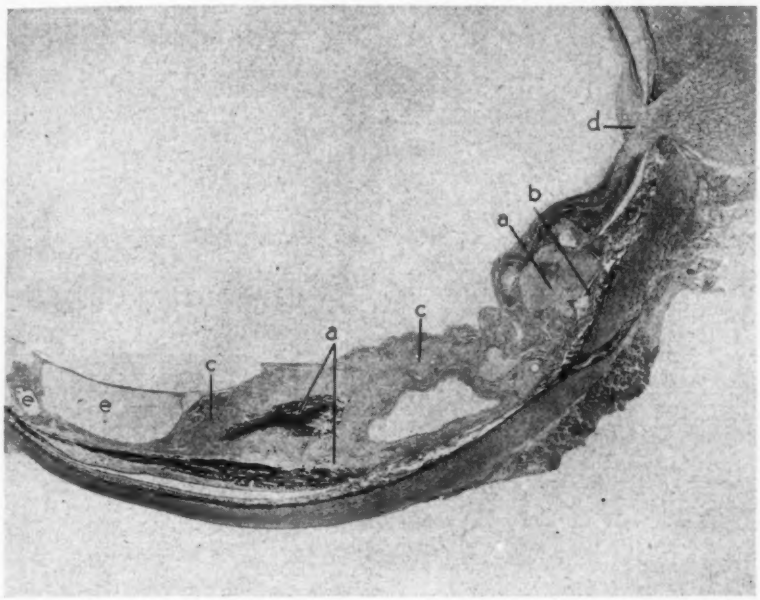

Fig. 4 (Reese). Microscopic section, case 2: a, dense homogeneous fibrous tissue laid down by pigment epithelial proliferation; b, bone; c, neuroglial proliferation; d, disc; e, contracting bands forming cysts.

The physical examination was entirely negative. A Wassermann reaction and Schick-Mantoux test were negative. Calcium could not be demonstrated in the globe by roentgenogram.

Microscopic Examination: From near the temporal border of the disc there appeared, in and under the retina, large irregular masses of fibrous tissue of two distinct types which were rather sharply demarcated one from the other. The one (fig. 4a) was lighter-staining, more homogeneous, dense, the nuclei rather sparse. This seemed to be in close relation to the pigment epithelium and was probably laid down as a result of its proliferation. In it were large plaques of readily recognizable pigment epithelium growing in cords which coursed mostly parallel, and in places the internuclear element was hyaloid in appearance. Some areas of bony degeneration were present (fig. 4b). The other type of fibrous tissue stained more intensely with eosin, was much richer in nuclei, and more fibrillar. This tissue was adherent to, and more or less enveloped, the first-mentioned type and represented a neuroglial proliferation of the retinal supporting tissue. Only remnants of the nuclear layers were seen. Throughout both types of fibrous tissue there were cholesterin crystals and small remains of old blood. Two types of pigment were seen diffusely scattered or in foci: the one was phagocyted pigment from the pigment epithelium and the other was hematogenous pigment which gave a positive Perl stain. A few scattered lymphocytes were noted. Contracting bands, particularly in the periphery temporally, had pulled the fibrous tissue into cystic spaces (fig. 4e). There was no retinal detachment. The blood vessels in the lesion, and to a less extent

in the retina, showed some sclerosis. The latter vessels showed a very definite perivascular infiltration of lymphocytes which produced the white streaks along the blood vessels seen ophthalmoscopically. The choroid and anterior sector of the globe were not remarkable.

hand movements. There was a left esotropia of 45 degrees.

The fundus examination of the right eye was negative. In the left eye there was a grayish-white elevated mass surrounding the disc and extending in a fan shape nasally and temporally. On the temporal side this extended beyond

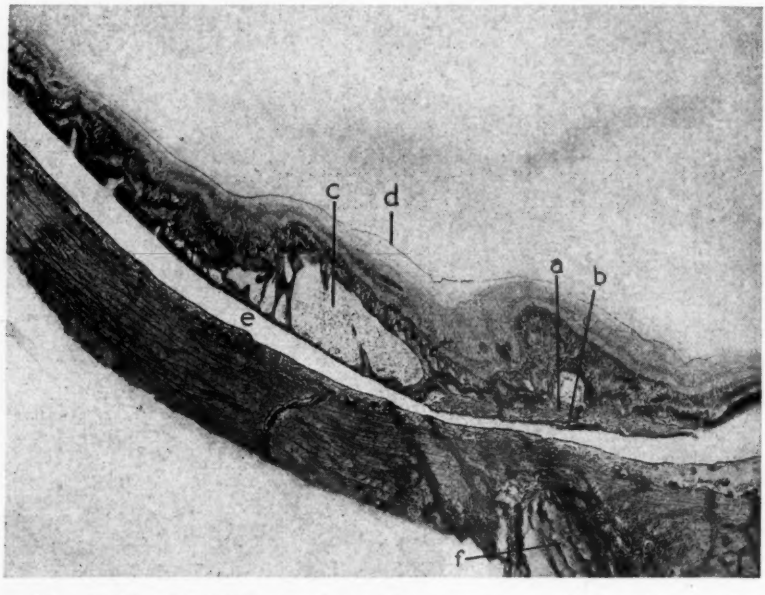

Fig. 5 (Reese). Microscopic section, case 3: a, fibrous plaque—the retina is adherent to it and thrown into folds by its contracture; b, proliferated pigment epithelium; c, cysts of retina; d, artifactitious detachment of internal limiting layer of retina; e, artifactitious detachment of retina from choroid; f, optic nerve cut tangentially.

Case 3.

History: A boy, aged 7 years, had not been able to count fingers or recognize objects with the left eye for years. This eye had converged for some time. There had been no pain nor redness. The child had been delivered with difficulty by aid of forceps. He was an adopted child, and the foster-mother stated that at the age of nine weeks he had a forceps mark across the left brow, pink in color, gradually changing to brown, but the mark had disappeared in the course of a year. There was also a drooping of the left upper lid which disappeared in about two months. The mother's Wassermann reaction was negative.

Clinical Examination: The vision of the right eye was 20/20; that of the left eye was reduced to the perception of the macular region and overlay the disc so that only about one third of the disc circumference was visible. Many newformed blood vessels were seen on the surface of the mass.

Microscopic Examination: Adjacent to the disc and more temporally than nasally, was a fibrous plaque (fig. 5a) in the external retinal layers and under the retina. It was adherent to the adjacent choroid because of pigment epithelial proliferation which extended into it. Throughout the fibrous tissue was some free and phagocyted epithelial and hematogenous pigment. A few cholesterin crystals were noted. No inflammatory reaction could be observed except an occasional lymphocyte. The surrounding retina was drawn into the contracting fibrous lesion. Some quite

large and small cystic spaces were seen in the retina temporal to the lesion (fig. 5c), located primarily in the external plexiform layer and filled with eosin-staining granules. There was an artifactitious detachment of the retina from the choroid (fig. 5e), and of the internal limiting layer of the retina (fig. 5d). The retinal blood vessels showed some perivascular infiltration of lymphocytes.

Discussion

The organization of retinal hemorrhage produced at birth, or by trauma after birth, seems to be the etiological factor in these cases. In cases 1 and 3, there is certainly the history of sufficient trauma to the involved eye. In case 2, there is only the history of instrumental delivery. However, retinal hemorrhages in the newborn with normal delivery are not uncommon because of the congestion produced in the jugular area, the veins of which have no valves. Thus the full force of the pressure of the congested vessels is transmitted to the weaker terminal vessels. Sharpe and Maclaire have found bloody spinal fluids in forty-six out of five hundred consecutive newborn infants, and conclude, therefore, that intracranial hemorrhage occurs in approximately 10 percent of the newborn, and in most instances is unattended by any sign which would cause it to be suspected. Factors that seem to predispose to intracranial hemorrhage are a prolonged labor, especially when forceps are used as a last resort instead of early, premature deliveries, breech extraction, spontaneous or precipitate births, too strenuous efforts at resuscitation, asphyxia, interference with fetal or placental circulation, such as pressure upon the umbilical cord, and premature separation of the placenta.

It is interesting to note that the 10 percent of intracranial hemorrhages of the newborn reported by Sharpe and Maclaire corresponds to the 10 percent retinal hemorrhages of the newborn reported by De Vries and others. Some of the intracranial hemorrhages of the newborn are quite massive and lead to death or permanent serious involvement of the function of the central nervous system, particularly cerebral spastic paralysis associated with mental retardation. As the retinal circulation is a continuation of the intracranial system, it is not unlikely that similar massive hemorrhages occur occasionally in the retina of newborn infants, and that the organization leads to the type of condition described in this paper.

The evidence that the lesion in these cases has resulted from the organization of hemorrhage seems to be sufficient. The Perl stain showed the presence of hematogenous pigment, or hemosiderin, in cases 1 and 2. No such stain could be employed in case 3 because of the lack of sections. This stain would give a similar reaction for siderin occurring as the result of a foreign body, but there is no evidence that a foreign substance entered the eyes. The lack of inflammatory reaction in and around the retinal lesion and the presence of cholesterin in cases 2 and 3 also support the thesis of organized hemorrhage as the basis for the lesion.

The primary site of the hemorrhage in these cases seems to be the external plexiform layer of the retina, which is the layer in which retinal vessels terminate. From here the hemorrhage may spread out in the external layers of the retina and particularly to the subretinal space. The adjacent pigment epithelium proliferates into fibrouslike plaques uniting the retinal lesion to the choroid. This accounts for the fact that in no one of the cases was there a retinal detachment. It is quite possible that an extensive lesion in the latter stages, when more contracture takes place, could produce a detachment of some of the adjacent retina, or the retina together with the choroid. Also, the gradual contracture of the fibrous tissue can pull into it more and more of the adjacent retina and thereby give the lesion the appearance of progressing. This occurred in cases 1 and 2, and led all the more to the suspicion of a retinoblastoma. The lesions were all in the vicinity of the macular region, which apparent predilection cannot be accounted for unless it is because hemorrhage is loath to become absorbed in this rela-

tively vascular area and is therefore organized.

In adults, trauma seems more likely to produce hemorrhage, not at the terminal vessels in the external layers of the retina, but from the larger vessels in the internal layers. The hemorrhage, therefore, tends to spread, not under the retina but inward toward the vitreous. In such instances, if the hemorrhage remains within the confines of the internal limiting layer of the retina, it probably is more readily absorbed than in the avascular external layers or subretinal space. Any organization of it leads to detachment of the retina, for there is no choroidal reaction to hold the retina and prevent its detachment. If the hemorrhage gets beyond the confines of the internal limiting layer, it enters the vitreous and either becomes absorbed or is organized, giving the picture of retinitis proliferans.

There are other conditions due to retinal hemorrhages which organize into fibrous masses similar in some ways both clinically and pathologically to the type described in this paper. Among these can be mentioned exudative retinitis of Coats, retinitis circinata, macular degeneration and disciform of Kuhnt-Junius. Metastatic ophthalmia can simulate the condition ophthalmoscopically.

Coats ascribed all of his cases to the organization of hemorrhage in the external layers of the retina and the subretinal space. The underlying causes of the hemorrhage varied in the different cases. In some he thought it due to an abnormal character of the blood, in others to vascular defects which may have been congenital, while others must have occurred at birth or from trauma.

De Wecker and Ammann have shown that the underlying factor in retinitis circinata is hemorrhage in the external layers of the retina. There are a number of reports in the literature of cases in which a typical retinitis circinata occurred in one eye and a large white retinal mass in the other eye in which no retinitis circinata was present. Fisher has called attention to the similarity of these cases clinically and pathologically to those described by Coats and there is the same similarity to the cases described in this paper.

Conclusion

Retinal hemorrhage in children can organize into a fibrous mass resembling clinically a retinoblastoma. Due to contracture, more and more of the retina can be pulled into the lesion, giving it the appearance of progressing, and thereby leading all the more to the suspicion of a retinoblastoma. There is usually no detachment of the retina because the lesion is adherent to the choroid. The retinal hemorrhage occurs at birth from the same conditions that produce the analogous condition of massive intracranial hemorrhage. It may occur as the result of trauma in early childhood.

I wish to thank Mr. N. E. Ross for the technical work and photomicrography, and Mr. Gustav Bethke for the drawings.

635 West One Hundred Sixty-fifth Street.

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MICROANATOMY OF THE EYE WITH THE SLITLAMP MICROSCOPE

I. Comparative anatomy of the angle of the anterior chamber in living and sectioned eyes of Mammalia. Part III

M. URIBE TRONCOSO, M.D. AND RAMON CASTROVIEJO, M.D.
NEW YORK

Part III describes the details of the angle of the anterior chamber in Primates (M. rhesus, chimpanzee) and in man. The illustrations, the summary, and the bibliography will be found in Part I, published in the preceding issue but one, in which also appeared a description of the apparatus and method and the details of the angle in Rodentia (rabbit). Part II, which appeared in the preceding issue, covered the findings in the angle of Ungulata (sheep and cow) and Carnivora (dog and cat). From the Institute of Ophthalmology, Columbia-Presbyterian Medical Center.

III. PRIMATES

7. MONKEY (Macacus rhesus).

Gonioscopy: With the animal under ether anesthesia, the contact glass was applied to the eye, but as this was very small, one of the lids stayed under the glass. However, the space between cornea and glass was filled with water. Through the aperture of the lids, a view of the angle could be obtained. It showed a striking similarity to the picture seen in man (see page 585).

The iris is golden yellow in color and when dilated shows numerous contraction furrows and dots of pigment (fig. 22). The ciliary border or edge of the iris, R, is slightly sinuous, contrasting sharply with a wide dark band, the ciliary-body band, CB, which, running alongside, lies at a deeper level.

Above this band there is, in some animals, a narrow yellow stripe which, as will be seen later, corresponds to a new structure, Schlemm's canal.

Beyond this stripe there is a narrow, brilliant, white line and then a white scleral crescent, Sc, the inner part of the corneo-scleral limbus. Finally, there come into view the inner dome and the optical section of the cornea, C.

Microanatomy: The enucleated eye was hardened and cut along the vertical meridian. The section was mounted dry on the special stand and the angle focused in the middle. The dark-brown band of the ciliary body (fig. 23) is clearly seen below the iris and under high magnification (×30) resolves itself into numerous vertical, variously shaped, interlacing lines and dots of black pigment lying upon the scleral wall and ending above in a clear-cut, broken line. If the iris is pulled down with a probe or hook, the picture changes entirely (fig. 23): the stretching brings strikingly into view a mass of thin, white-gray, semitransparent fibers, CB, running in a vertical direction and lying at different levels, but interlacing and criss-crossing. They resemble a delicate, gossamer lacework and correspond to the fine strands of the pectinate ligament in Carnivora.

As these fibers separate from the scleral wall the pigment fades and becomes invisible, showing only the upper, broken line of insertion to the sclera. The fibers, however, do not end on this broken line as would appear at first sight. When stretched they can be followed up for a considerable distance until they merge with the corneal tissue. This fact is clearly established in a section, and particularly in specimens under water, as will be shown later. The ciliary-body band followed to the border of the section, proves to be due to the upper end of a layer of pigment lining the suprachoroidal space between the sclera and the ciliary body (fig. 23, A). The upper, broken, clear-cut line of the ciliary-body band thus corresponds to the insertion of the upper and outer angle of the ciliary body into the sclera at the end of the suprachoroidal space. This cilio-scleral pigment is seen through the pectinate and the fibers of the ciliary body, which during life are transparent, the pigment layer, A, serving as a background. As we examine on the edge of the section the structures forming the angle of the chamber, we are confronted with the

fact that the cilio-scleral sinus has almost disappeared. The ciliary body is no longer divided into two portions, but becomes a compact, triangular structure, with its base toward the anterior chamber. The ciliary muscle is enormously developed. The course of its fibers is clearly traceable, the latter being separated into bundles running in different directions by broken lines of pigment. They end in a narrow tendon which continues the meridional and some of the radial fibers and is strongly attached to the sclera below a new structure, a small fissure between the edge of the cornea and the inner tip of the sclera, Schlemm's canal, which will be described later.

Using higher magnification (×30) the fibers of the pectinate are clearly seen at the edge of the section. They have a triangular, fanlike arrangement and run, as in Carnivora, from the corneal border above to the root of the iris and the ciliary body below (fig. 24). From the most superficial is suspended the root of the iris, as in Carnivora. The iris ends in a square shoulder. Between its root and the anterior, concave, base of the ciliary body, is a small curved cleft (PL, fig. 24), which represents what is left of the cilio-scleral sinus of Carnivora. This cleft is filled with the numerous deep fibers of the pectinate, which, coming from the cornea, are attached below to the anterior border of the ciliary body at various levels, going even beyond the root and forming a compact, grayish, meshwork which fills the angle proper.

Junction. The cornea is thin in small animals and in some specimens swells near its border (fig. 24, C). The junction is situated far below the insertion of the conjunctiva (OP, fig. 23). In Macacus this membrane is so charged with pigment that its entire surface has a brown coloration. At the point OP, there is a wide circumcorneal pigment ring which can be seen from the inside through the corneal layers as a faded dark-brown circle. The border of the cornea, B, has a round or angular shape (figs. 23 and 24), descends almost to the level of the iris, and fits into a notch of the sclera, whose outer slant can be followed to the conjunctival insertion. The corneo-scleral junction except for minor differences is similar in the vertical and horizontal meridians.

Schlemm's canal. This new structure is a channel between the lower margin of the cornea and the upper border of the sclera, immediately above the insertion of the ciliary body. Schlemm's canal is difficult to see in the horizontal section of this bisected eye, while in the vertical it is easily found. This seems to be due to the smaller size of the canal in the former direction. However, it can be observed even in a horizontal meridian, by turning the dry section gradually lateralward, and using transillumination. The canal appears sometimes as two narrow, parallel slits lying obliquely behind the pectinate (fig. 24, CS. Its lumen can be opened by pulling the root of the iris inward, but shows no widening when the muscle fibers are pulled down with the forceps. This, in our opinion, means that the contraction of the pupil may have an effect in widening the lumen, but not the contraction of the ciliary muscle, as some authors contend.

With some difficulty, a very fine wire from a hypodermic needle can be inserted into the canal under guidance of the microscope.

If the specimen is placed under water and high magnification employed, two sets of fibers can be observed on the inner wall of the canal. The internal one, facing the anterior chamber (PL, fig. 24), is made of numerous fibers which run first in a straight course from the cornea downward, cover the canal, and then curve down to attach themselves to the root of the iris and the anterior border of the ciliary body for about two thirds the length of the latter. This set of fibers may be considered a development from the cribriform ligament which has accompanied the ascension of the scleral insertion of the ciliary muscle and has grown more compact. The other group, T, is made of the most external strands of the pectinate and runs in a straight course throughout, closing the sulcus inward and attaching itself downward to the edge of the sclera.

The iris has a smooth surface and appears at the edge of the section as a compact structure filled with a large amount of golden pigment in streaks.

The ciliary processes are not so large as in lower Mammalia, but similar to those of man. They have numerous folds and end a little beyond the root of the iris.

Dissection: Upon pulling the iris with force, the membrane gives way and detaches itself from the ciliary body carrying with it a few fibers of the pectinate. If the ciliary body itself is displaced inward, the fissure between it and the sclera, the suprachoroidal space, widens, and it can be seen that the principal attachment of the whole mass of the ciliary body lies at the anterior and outer angle only, where the tendon of the ciliary muscle is inserted into the scleral wall. If this gives way the ciliary mass is detached, carrying with it some of the pectinate fibers, which can be seen at the bottom, stretched and still bridging the gap, but the largest part of the meshwork stays in place, covering the inner side of the corneo-scleral sulcus.

The scleral wall is lined all over with streaks and dots of pigment up to the upper line of the ciliary-body insertion, while the ciliary wall is white and ribbed and ends above in a sharp, wavy border.

8. CHIMPANZEE.

Gonioscopy could not be carried out, only the removed eyes being available for study.

Microanatomy: Frontal Aspect. In the bisected globe (fig. 25) the iris, being too high, was permanently depressed with a wire hook attached below, and the specimen mounted in a jar. The pigmented edge of the iris is raised up on triangular, tentlike elevations, to the apex of which fine, delicate, white, or entirely pigmented fibers are attached. Sometimes the bases are perforated and made of interlaced, pigmented strands. The contraction furrows are very noticeable in the iris, forming a series of mounds or hills in rows.

The fibers in the background suspend the edge of the iris as in Carnivora and can be seen laterally in numerous rows rising upward upon the inner surface of the cornea until they are lost to sight above the level of Schlemm's canal.

Following the structures to the edge of the section (fig. 25) the stouter suspensory ligament of the iris, PL, is clearly seen. The iris ends abruptly in a square shoulder whose upper border is suspended from the cornea, while the lower edge, IR, is continuous with the ciliary body. Between these structures and the sclera there is a narrow cleft or sinus (fig. 25, S), which is entirely filled with the pectinate fibers, as in M. rhesus.

The sclero-corneal junction was very indistinct in the eyes examined. The corneo-scleral slant, however, appeared to be very long inside and to contain Schlemm's canal at the corneal tip.

The ciliary body has the same aspect as in man, except that the circular fibers are not visible. The suprachoroidal space is very heavily pigmented and its upper border ends below a scleral spur, K, where the tendon, embodying the upper edge of the ciliary body, is inserted.

Schlemm's canal. The canal lies in a special sulcus of the corneo-sclera and is much more clearly visible than in M. rhesus. The sulcus is closed inside by the trabeculum, T, which is made of parallel fibers and then by the slanting filaments of the pectinate, PL.

IV. MAN

Gonioscopy: The scope of this paper does not permit a full description of the human angle as seen in the living eye. This may be found in previous articles.[4] The surface of the iris is divided into two zones clearly separated by an elevated, wavy ridge, the lesser circle of the iris (fig. 26, A). On the ciliary zone the contraction furrows are the most striking feature. The radiating ridges are conspicuous in some eyes (fig. 26), in others less apparent. The visible edge of the iris, R, is called the last roll (Fuchs). Upon it appear, in some eyes, straight, indented elevations which resemble a row of trees in the background of a landscape, the iris processes. The

root of the membrane is not visible, being inserted into the ciliary body below the last roll (fig. 27, IR). Beyond the edge of the iris there is a brown band, the ciliary-body band, CB, a narrow, smooth or striated stripe, whose color changes according to the color of the iris and the subject's complexion. It is dark brown or almost black in brunettes and light brown in blondes (fig. 27). Its upper border corresponds to the insertion of the ciliary body into the sclera, and is usually a clear-cut, wavy, or broken line. Sometimes it is indistinct. The ciliary-body zone is wider or narrower and its breadth changes according to the position of the gonioscope. By slightly tilting the instrument it is possible to examine the dark concave sinus formed between the root of the iris, the anterior concave border of the ciliary body, and the inner surface of the corneo-scleral slant (CB, fig. 27). Beyond the ciliary body there is usually, in young persons, a bluish band, which corresponds to the pectinate ligament and sclero-corneal trabeculum covering Schlemm's canal, Schlemm's zone or band. In old persons this band does not usually appear and the limbus is entirely white; at other times it has a yellowish or brownish hue (CS, fig. 26), and is covered with scattered dots of black pigment. Between the insertion of the ciliary body and Schlemm's band there is, in some eyes, a brilliant white, narrow line, where the scleral spur shows through. Above Schlemm's zone another white line may also appear, although rarely, the upper edge of the scleral sulcus, which some authors assign to the "anterior-border ring" of Schwalbe.

Farther above there is a white crescent, the inner side of the limbus, showing the white color of the sclera through the sclero-corneal slant. Beyond, there is a smaller bluish crescent, the lower part of the corneal dome, D, and finally the yellowish, optical section of the cornea, C. The contact glass appears above in a dark optical section.

Microanatomy: The angle in man is formed by two walls, the anterior, external, or corneo-scleral, and the posterior or uveal (iris and ciliary body).

Anterior wall. In fresh meridional sections the cornea, as seen with the slitlamp, is easily distinguished from the sclera by its semitransparency, which gives to it a bluish color, while the sclera has a white coloration and is traversed by brilliant white, sinuous lines, parallel to each other and to the scleral surface and ending in an almost abrupt border where the blue cornea begins.

In fresh specimens, the cornea has a uniform breadth, but in post-mortem sections it appears thickened near the corneo-scleral junction at its inner surface (A, fig. 27).[20] The degree and shape of this thickness depend in large part upon the swelling of the cornea, while the sclera swells very little. In some corneas there are even two internal thickenings (A, B, fig. 27), while outside the membrane is swollen at the point C only. At the place where the cornea meets the sclera externally there is a depression or furrow called "external scleral sulcus" (Schwalbe) which is filled by the conjunctival insertion. This is not really a sulcus, but simply a furrow or depression due to the difference of curvature between the corneal and scleral segments. The internal surface of the cornea has a deep sulcus exactly at the level of the internal furrow. This has been called the "internal scleral sulcus." It is a deep groove carved into the cornea and sclera, its posterior border formed by the sclera and projecting inside the eye by a dense prominence to which the tendon of the ciliary muscle is attached, the scleral spur.

With the slitlamp, Descemet's and Bowman's membranes are very clearly seen, especially the former as a glassy transparent structure.

Junction. As stated before, the line of separation between cornea and sclera is better seen in fresh specimens that are placed in formalin immediately after enucleation, sectioned, and examined as soon as possible. In eyes removed long after death, the cornea has lost its transparency and its limits are very difficult to recognize. The section of the globe should be made with a very sharp knife and in a direction exactly

perpendicular to the surface of the membranes. The examination should be made first under low (×15), and then under higher magnifications, using direct light of various intensities and transillumination.

In man the difference between the horizontal and vertical meridians of the globe is not so marked as in the lower mammalia. The cornea ends in a pointed tip, blunter than in the monkey (fig. 27 bis), and descends to the level of Schlemm's canal, which is thus located at the inner side of the cornea, except for a few fibers of the sclera that are interposed between both.

The scleral border ends in a notch with very unequal sides (fig. 24), into which the corneal tip fits. The external side of the notch is larger and slants from the insertion of the conjunctiva externally to near the lower (posterior) limit of Schlemm's canal. There the inner, thin side of the notch starts, rises at a sharp angle, lines the outer wall of the canal, and ends directly above it. These few scleral fibers probably provide a stronger framework for the sulcus. The inner notch forms the posterior border of the corneo-scleral groove, which ends inside in a triangular projection that gives insertion to the tendon of the ciliary muscle, the scleral spur. F. Ridley,[25] has contended that from the physiological standpoint Schlemm's canal is a part of the cornea.

His technique is as follows: He replaced the aqueous of a freshly removed eye with distilled water and then with a 1-percent solution of silver nitrate, and placed the eye in a 4-percent solution of cane sugar in distilled water. The sugar exerts an osmotic action and assists the passage of the silver salt into the cornea. The eye is then bisected and placed in formol-saline solution to fix both the silver and the tissue. Sections exposed to light show that a triangle of deeply stained corneal tissue is continuous with the substantia propria and extends as far back as the root of the iris, totally including Schlemm's canal. The sclera remains unstained by the silver.

The slitlamp examination partly supports this view as the corneal tip is in close relation to the canal except for a few fibers of the scleral slant.

In the horizontal meridian the outer side of the scleral notch slants much less to meet the edge of the cornea, which is blunter.

Comment. The common belief that Schlemm's canal is wholly situated in the sclera is due chiefly to the results of microscopical examinations. The limits of the corneo-scleral junction are very difficult to recognize, for both structures stain almost alike and the cornea merges gradually into the sclera with no line of demarcation. For this reason it has been necessary to use anatomical landmarks. According to Salzmann,[21] if the ends of Bowman's and Descemet's membranes were joined by an imaginary line, it would be almost parallel to the outer part of the corneo-scleral border and at a distance of about 0.75 to 1 mm. from it. In his figure he draws this imaginary line in a direction about parallel to the optic axis of the eye. Close to the canal, however, it curves abruptly, in order to keep the latter well within the sclera.

Pectinate ligament. A meridional section of a fresh human eye is placed in the stand and examined first under low and then under high magnification. The frontal aspect with the former is quite similar to the gonioscopic picture, the details of the iris, the last roll and the darker band of the ciliary body appearing quite distinctly. Under high magnification many more details can be recognized, but to obtain a full view of the angle and sinus it is better to draw the iris down with a hook or probe. Then, above the last roll, appear numerous delicate white fibers, slightly pigmented, similar to those found in monkeys and Carnivora, but much less developed, the pectinate ligament (figs. 27, 28, and 30 PL). These fibers show very well when they are made taut by the traction of the iris. They are attached below to the iris root, under the last roll, by two or three separate roots. From there they follow the curvature of the small depression or sinus between the iris root and the insertion of the ciliary body and continue upwards, crossing Schlemm's zone meridionally until they reach the edge of Descemet's membrane where they become inserted into the nearby corneal stroma. These fibers are much more numerous than

they were supposed to be, according to classical descriptions based on microscopical examinations only. Following the structures to the edge of the section, the course of the filaments can be easily traced as they round the sinus. Many of them, however, instead of curving, bridge the recess in a straight course (fig. 28, PL). They can be better observed in specimens kept under water.

The ciliary-body band. Between the last roll of the iris and the insertion of the ciliary body into the sclera, the frontal aspect shows a horizontal band of a darker color than the iris, very apparent both by gonioscopy and under the microscope. It is called in the terminology of the former, "the ciliary-body band or ciliary-body zone." This band is limited below by the wavy edge of the iris and above by a clear-cut, broken line, which is the insertion of the ciliary body into the sclera. Following this band to the edge of the section, Schlemm's canal appears very conspicuously as an oblique slit (CS, figs. 27 to 30) which is covered not only by the pectinate fibers but also by a delicate, slightly prominent, meshwork tissue, the so-called trabeculum sclero-corneale, which will be studied later. The suprachoroidal space is much less pigmented than in the monkey, so that the brown coloration of the ciliary-body band is not due to the scleral pigment showing through, as in this animal, but to the pigmentation of the anterior border of the ciliary body itself (CB, fig. 31) and, to a less degree, to dots of pigment deposited in the strands of the pectinate. This explains why in blonde persons with blue irides, this band has a much lighter coloration (fig. 27, CB) while in brunettes, who have a larger amount of pigment, it appears dark brown (fig. 29). Another factor which must be reckoned with is the shadow cast by the prominent last roll of the iris when the illumination of the angle comes from rays parallel to the surface of the iris. This is readily observed by microdissection. When the last roll is very high and the anterior chamber shallow, the ciliary-body band appears as a dark line. Pulling the iris down with a forceps, the dark color of the band fades and at last disappears, if the stretching is such that the last roll flattens and the sinus is obliterated by the taut pectinate strands. There is the possibility, however, that in eyes removed *post mortem* these strands would be slightly opaque and upon being separated from the surface of the ciliary body by the traction, would conceal in part the pigmentation of the latter. Above the upper limit of the ciliary-body band, the scleral spur appears in some eyes as a thin, brilliant, white line. Beyond this the meshwork of the angle or Schlemm's zone, as it is called in gonioscopy, is in some cases, usually in adults, covered with brown pigment that is deposited either diffusely (fig. 26) or in continuous, narrow, streaks (CS, figs. 29, 31, and 32) at the level of, or above, the canal.

The sinus or recess of the angle. We have seen that in lower mammals there is a fissure between the two walls forming the angle, the cilio-scleral sinus, whose space is filled with the numerous fibers of the pectinate ligament, attaching and suspending the root of the iris upwards and connecting the detached portion of the ciliary body to the corneo-scleral wall. In the monkey, this fissure has almost disappeared, but there is still a small sinus between the iris root and the anterior, concave border of the ciliary body. The iris is still suspended from the cornea by the pectinate filaments. However, in the chimpanzee, the root of the iris becomes attached to the anterior border of the ciliary body by a narrow strip of tissue (fig. 25). In man, although the rudimentary fibers of the pectinate ligament are still inserted into the last roll and upper part of the iris root, they do not serve to suspend the membrane, which has become firmly attached to the ciliary body by a narrow strip of tissue, and no longer needs to be supported. Below the last roll, between the iris root and the scleral wall, is thus formed a small, usually semicircular, depression. This is the only vestige of the cilio-scleral sinus of lower Mammalia. In the recess, the anterior border of the ciliary body is directly

exposed to the anterior chamber, being covered only by the fibers of the pectinate.

The ciliary body. The ciliary body due to the enormous development of the ciliary muscle, is still more developed than in the monkey. In the section, the direction and course of the muscular fibers can be beautifully seen. In man as in monkey, the ciliary body is attached to the scleral wall only by a narrow band of tissue, between Schlemm's canal and the beginning of the suprachoroidal space. This band is formed mainly by the direct tendon of the ciliary muscle for the meridional fibers (fig. 27), which forms the fixed point for the contraction of these fibers when they draw forward the choroid and posterior part of the orbiculus ciliaris. The pectinate ligament (so-called uveal trabeculum) is most probably in man a check ligament which keeps the radiated and especially the circular or sphincterlike fibers in position when the ciliary processes advance toward the sagittal axis of the eye during accommodation.

Schlemm's canal. As stated before, the slit which forms the canal is very conspicuous in the section and seems larger than in the microscopical preparation. It usually appears single and does not show, at this magnification, the two or more lumina which several authors describe, and which in their opinion, invalidates the propriety of the name "canal." The slit can be easily probed with the fine wire of a hypodermic needle, which after penetrating into the lumen is seen by translucency through the inner wall for a certain distance (fig. 32), until finally, if pushed too far, it perforates the wall. As the ligamentum pectinatum has been detached with the ciliary body, we can observe that the open side of the corneal groove has been filled and closed by a special membrane, a thin and semitransparent structure. We have seen that in the monkey the sulcus is covered by the outer fibers of the pectinate, but in man the inner wall of Schlemm's canal is composed of a meshwork of fibers (T, fig. 28), which is attached below to the lower border of the sulcus by a thick base, and above to the upper edge of the corneal sulcus, forming a thin, spongy, prismatic structure which has been called the "trabeculum sclerocorneale" (Rochon-Duvigneaud[18]) the "scleral trabeculum" (translation of H. Virchow[9]), the "meshwork of the iris angle" (Salzmann[21]), or may be briefly designated as the sulcus trabeculum.

Summing up we have in the sinus of the chamber in man two distinct fibrillary structures: 1. Strands spanning the angle and connecting the iris root and anterior part of the ciliary muscle with the end of Descemet's membrane and cornea, the pectinate ligament. 2. A fenestrated, or spongy portion, made of delicate trabeculae, filling the aperture of the corneal sulcus and forming the inner wall of Schlemm's canal, the sclero-corneal trabeculum or, better, the sulcus trabeculum.

Dissection: The sulcus trabeculum easily observed under the microscope if after detaching the ciliary body at its insertion and the pectinate ligament (fig. 32) Schlemm's canal is probed with a wire, A, and a lateral inward pressure made upon the trabeculum, T. The meshwork usually is ripped downwards and the probe can lift it as far as its upper attachment. As stated before, when the ciliary body is torn away in mass (fig. 32) it carries with it both the pectinate ligament and the sulcus trabeculum, which remains attached to the upper edge of the sulcus.

Tearing the root of the iris (fig. 30), the pigmentation of the anterior border of the ciliary body, CB′, from the processes to its line of insertion, is readily seen. If the ciliary body is then separated from the sclera it usually gives way at the upper line of insertion (O, fig. 32), but more rarely it carries away the whole meshwork splitting Schlemm's canal (fig. 31). In the first case, the ciliary insertion (O, fig. 32) appears as a thick, triangular, clear-cut edge, which at the farther end, where it is detached, shows the taut fibers of the pectinate, PL, adherent to the corneal wall. These fibers seem to end at the line of pigment but in reality they continue upward to the end of Descemet's membrane. In the gap, both sides, the

ciliary and the scleral, are covered with streaks and dots of brown pigment.

Comment: As said before the descriptions and terminology of the structures of the angle have changed a great deal. Going down from man to animals, the fenestrated and fibrillary tissue filling the sinus of the angle was considered peculiar to man. In his textbook Professor Fuchs (Duane translation) says: "The anterior chamber is lined by a peculiar tissue, which once universally and still pretty often, is denoted by the rather unsuitable name of ligamentum pectinatum, but is also called the trabecular structure of the sinus."[24] In a foot note on the same page he adds: "The name ligamentum pectinatum was given by Hueck to a structure which may be present in the horse, but not in man." T. Collins in his interesting monograph[15] states that "these bands of iris tissue (the iris pillars) which are not present in man's eye, give the toothed appearance to the ligament and led to its being compared to a comb."

Henderson[5] declares that "there is no such structure as the pectinate ligament in primates." Salzmann,[21] adopting the name used by H. Virchow,[9] calls it the "meshwork of the iris angle," and also considers it a peculiar structure. Seefelder and Wolfrum[11] (1906), on the other hand, recognized its resemblance to the pectinate ligament of Mammalia and retained the old name for the inner part, which runs from the cornea to the root of the iris, while they supported Rochon-Duvigneaud in calling the portion which closes the scleral groove "trabeculum sclero-corneale." H. Virchow introduced the names "uveal trabeculum" for the former fibers and "scleral trabeculum" for the latter.

If the structures of the angle are studied by comparative anatomy and embryology and with the new methods of microdissection, there is no doubt that the so-called uveal trabeculum is only the rudimentary ligamentum pectinatum of the animals. Its fibers run the same course from the root of the iris to the cornea. They are more similar to the fine, delicate strands of the Carnivora than to the stout, almost horizontal teeth of the Herbivora and run in the same vertical course. The difficulty in being recognized as the pectinate ligament was due in part to the microscopic technique, which gives a mistaken idea of their number and importance. Virchow in his monograph[9] states that in the adult eye, as a rule, nothing remains of the uveal trabeculum, or it is only represented by a few, sparse, pigmented fibers. Salzmann[21] says: "The two portions (the uveal and scleral meshwork) are of very unequal bulk; the uveal meshwork is a delicate, thin structure, which one can barely make out with the dissecting loupe. By far the greater part of the whole structure belongs to the scleral meshwork"; and farther on: "the uveal meshwork appears to be made up of only a few obliquely or longitudinally cut sections of delicate trabeculae lying wholly superficial along the inner surface. . . ." "One may about as well say that only scleral meshwork is visible in meridional section, for it makes up so much of the whole mass." In his teased preparation (plate III, fig. 3), the strands of the uveal trabeculum are mummified and thinned to such an extent that they give a thoroughly mistaken idea of its size and importance. J. Kubik,[17] however, recognized that in the adult quite considerable remains of the uveal framework are present, a view which he supported by ophthalmoscopy of the angle (Salzmann) by which he saw numerous longitudinal fibers corresponding to the uveal trabeculum.

Microdissection and gonioscopy show that the fibers of the pectinate are very numerous and well developed (figs. 28 and 29). The trabeculum which fills up the aperture of the sulcus and which with Schlemm's canal forms a structure peculiar to primates, is a thin meshwork which has histological characteristics different from the fibers of the pectinate.

Schlemm's canal as an outlet. This canal has been the subject of considerable research both from the anatomical and physiological standpoint. Many authors have repeatedly tried to find it in animals, not only in Mammalia (Lau-

ber,[12] Maggiore[22]) but also in birds (chicken, Rochon-Duvigneaud[18]).

Undoubtedly the deep cilio-scleral sinus in lower Mammalia is a part of the anterior chamber and is filled with aqueous. The fluid must find its exit through the neighboring vessels, and going down the scale, many researchers have interpreted the vessels running into the sclera, near the wall of the cilio-scleral sinus, as being comparable to Schlemm's canal. Others consider the meshwork of the tendon covering these vessels similar to the corneo-scleral trabeculum of man. T. Henderson[5] describes the tendon "on the inner side of Schlemm's canal," that is, on the inner side of the intrascleral vessels.

This identification is not accurate. Schlemm's canal is a new outlet built inside of a special corneal groove which has a permanent anatomical place and can always be found above the insertion of the ciliary body, while in lower mammals nothing comparable exists. The vessels of the intrascleral venous plexus are located at different points, and at different distances from the surface of the scleral wall, according to the sections. A great confusion exists between this intrascleral plexus and the so-called "Schlemm's venous circle" in lower Mammalia. For some authors, Schlemm's circle means Schlemm's "canal," or its equivalent; for others, the whole band of veins corresponds to Schlemm's canal in a physiological way.

From a strictly anatomical standpoint the intrascleral venous plexus and Schlemm's canal are totally different. The former has numerous branches distributed extensively throughout the substance of the sclera and their positions and relations are different in each section and even in different sections, so that those who compare the single or double isolated veins, casually found near the inner surface of the sclera at the level of the upper part of the cilio-scleral sinus, with Schlemm's canal, must admit that they are not found in the same place nor even appear at all in different sections of the globe.

Nuel and Benoit[27] have advanced the theory that in the dog the intrascleral veins which come near the surface are in direct communication with the cilio-scleral cavity. They base their opinion upon the result of injections of India ink into the anterior chamber, which always shows the black particles penetrating the lumen of all the intrascleral vessels. In the cat, on the contrary, with the same technique of injection, the carbon particles of the ink accumulated around the numerous vessels of the ciliary body running close to the cavity of the sinus. Very few of the granules were found inside the intrascleral venous plexus. Thus in the cat these vessels could not be compared to Schlemm's canal, as they play very little part in the drainage, according to these authors. Contrary to the supposed analogy between the intrascleral vessels and Schlemm's canal, we should bear in mind that these vessels, mainly veins, are in direct connection with the general circulation, while Schlemm's canal, in primates, is apart from the actual course of blood, it is a diverticulum of the intrascleral veins, and within it conditions of movement and pressure of fluid are entirely different from those in the veins themselves.

The evolution of the ciliary body and the closing of the cilio-scleral sinus. The question may be asked if the evolution of the eye from lower Mammalia to man has closed the cilio-scleral sinus by adhesion of the two walls, or if, on the contrary, the sinus has been widely opened and the two walls separated in such a way that the apex of the sinus becomes the angle proper. To decide this question we must consider two anatomical landmarks: the end of Descemet's membrane above (forward) and the point of attachment of the ciliary body, or better still the end of the suprachoroidal space, downward. In Ungulata the end of Descemet's membrane is in line with the upper teeth of the pectinate and about at the same level as the iris surface. It thus forms the true angle of the anterior chamber, as can be seen with the gonioscope. The cilio-scleral sinus is only a recess of the chamber and is filled with a spongy tissue. Its apex corresponds to the scleral insertion of the ciliary body,

DISTANCES BETWEEN THE END OF DESCEMET'S MEMBRANE AND THE END OF THE SUPRACHOROIDAL SPACE IN MICROMETER SPACES AND ACTUAL MILLIMETERS (×30)

Ungulata			Carnivora			Monkeys			Man		
	Micrometer space	Actual mm.		Micrometer space	Actual mm.		Micrometer space	Actual mm.		Micrometer space	Actual mm.
Sheep	6.4	0.20	Cat	12.2	0.39	M. rhesus	2	0.06			
Pig	7.5	0.24	Dog	9.4	0.30	Chimpanzee	3	0.09	Man	3	0.09

which is located far downward, as the width of the sinus is considerable.

In Carnivora, the level of the iris surface is much lower and, in receding, the iris has dragged downward the strands of the pectinate, which take a fan-shaped arrangement. The end of Descemet's membrane is still at a level with the upper insertion of the stout pectinate fibers, but now it lies high above the edge of the iris and the angle proper. The sinus cleft is more apparent and appears wider. The scleral insertion of the ciliary body lies farther downward, so that the space between the end of Descemet's membrane and the end of the suprachoroidal space appears much larger than in Herbivora.

In monkeys, the cilio-scleral sinus is very small and the end of Descemet's membrane is still high above the edge of the iris, but much less so than in Carnivora. On the contrary, the end of the suprachoroidal space, the scleral insertion of the ciliary body, is separated from the end of Descemet's membrane by a narrow space, the width of the sulcus containing Schlemm's canal.

In man the end of Descemet's membrane is high above the iris root. The insertion of the ciliary body and the end of the suprachoroidal space, which are visible in the angle from in front as the ciliary-body band, are at a level with the iris root.

By direct measurements of the eyes with a micrometer affixed to the eyepiece of the slitlamp microscope, we have found the figures shown above, which are only approximate, as it is not always easy, in the different sections, to see clearly both points of reference.

From these measurements we may conclude that in Carnivora the meridional length between these distances is greater than in Herbivora due to the iris' receding backward, but in Primates there is undoubtedly an upper (forward) displacement of the insertion of the ciliary body into the sclera, which results in the closing of the cilio-scleral sinus. The cause lies in the great development of the ciliary muscle, which now occupies the space of the former sinus. If the cilio-scleral sinus had simply gaped in primates, the apex, that is, the attachment of the ciliary body to the sclera, should have stayed at a greater distance from the end of Descemet's membrane; on the contrary the attachment of the ciliary body has gone upward and is much nearer to Descemet's membrane. Hence the meshwork structure, called tendon of the ciliary muscle, should move upwards also and become the sulcus trabeculum, growing thicker to suit the functions of the new organ, Schlemm's canal.

In closing we wish to acknowledge our indebtedness to Prof. John M. Wheeler for his kind support in the completion and publication of this paper, to Dr. H. Arruga for valuable help in connection with the colored figures, and to the artist, Mr. Bethke, for the faithful and artistic reproduction of our specimens.

350 West One Hundred Sixty-fifth Street.

A METHOD FOR MAKING CASTS OF THE HUMAN CORNEA

C. L. STEVENS
NEW YORK

Models of keratoconus are preferable to mere measurements because they can be handled, viewed easily from any angle, and also form a permanent record of any given stage of the disease. It is possible that they may help in the manufacture of contact lenses. A method is described for making plaster casts of the human cornea. The technique was developed in connection with studies of human constitution in relation to keratoconus at the Institute of Ophthalmology of the College of Physicians and Surgeons and the Presbyterian Hospital, New York.

The work was made possible by a grant from Mrs. Lucius Wilmerding.

In connection with a project initiated by Dr. John M. Wheeler, to study the constitutional type of persons who develop keratoconus, he suggested that it might be desirable to obtain impressions of the cornea, and from these to make permanent models. While it is possible by optical methods to measure the degree and form of conical protuberance, a solid model which can be held in the hand and viewed from all angles provides a certain sense of definite satisfaction. Furthermore, such a model may perhaps help in the manufacture of contact lenses,* and finally, such models serve as a permanent record of any given stage of the disease. For this reason the casts provide a means of watching the advance of the conus.

The **materials** and **equipment** needed in preparing the molds are shown in figure 1. A descriptive list of them follows:

1. Negocoll (Dr. Poller's). Manufactured by Apotela Ltd., Zürich, Switzerland, and obtainable from Kern Co., New York City.
2. Aluminum container tubes. These are of two sizes, made from stock aluminum tubing of the following specifications:
   (a) Small size: Outside diameter, 3/4″; thickness of wall, 1/32″. The tubing is pressed into oval form—length 13/16″; breadth 11/16″. The height at the ends of the oval is 3/4″; at the mid-point of sides of oval, 1/2″.
   (b) Large size: Outside diameter, 7/8″; thickness of wall, 1/32″. Tubing is shaped to form an oval—length 1″; breadth 3/4″. The height at the ends of the oval is 3/4″; at the mid-point of the sides of the oval, 1/2″.
   These tubes can be obtained from J. J. Wenner, 36 East 12th Street, New York City.
3. Small double boiler.
4. Small electric heater.
5. One eye speculum (Week's). Obtained from E. B. Meyrowitz, New York City.
6. Thermometer. Graduated to 100°C., approximate length, 7″.
7. Five beakers: One 250-c.c. capacity and four 50-c.c.
8. Pantocaine—0.5-percent solution.
9. Gauze sponges.
10. Ordinary teaspoon.
11. Red crayon pencil (for marking container tubes).
12. French dental plaster (Regular), from the S. S. White, Dental Manufacturing Co., New York City.
13. Glass plate (beveled edges). Size: 6″ square, 1/4″ thick. (For pouring plaster cast.)
14. Two plaster-mixing bowls (of rubber), from the S. S. White, Dental Manufacturing Co., New York City.
15. Plaster knife and spatula.

Technique

The technique for taking the impressions requires a little practice before good molds can be obtained. But if the

* Bruno Prister, in Trieste, has attempted to make wax molds of the anterior segment of the eye for this purpose. We have had no experience with this method. Prister's work is abstracted in the Brit. Jour. Ophth., 1933, v. 17, pp. 588-89.

instructions that are given herewith are carefully followed there is no reason why any reasonably deft person should not secure perfect results. The technique as described is the one that has been most successful in our laboratory; but like all procedures on the living, it may not prove to be so satisfactory in the hands of other workers. It is offered merely as a pattern upon which, it is hoped, improvements will soon be made.

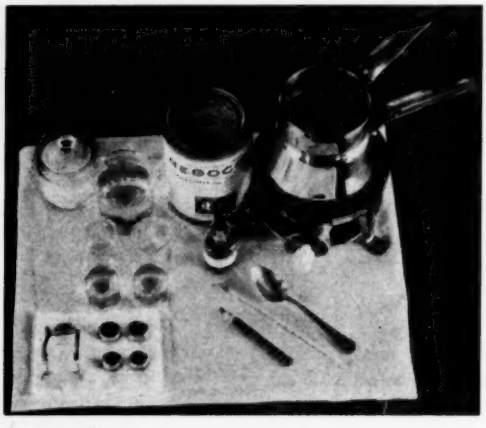


Fig. 1 (Stevens). Showing equipment for making Negocoll molds.

Fig. 2 (Stevens). Holding container tube in place upon the eyeball.

Procedure for taking the corneal impression: Pour approximately 12 oz. of hot water into the lower section of the double boiler; then put three heaping teaspoonfuls of Negocoll into the upper section, and add 1 oz. of warm water. When the water in the lower section is boiling, stir the Negocoll and add more warm water until the compound is smooth and of the consistence of heavy cream. It is important to eliminate all lumps.

The patient, who should lie flat upon a table or couch (a small pillow may be used for comfort), is then given pantocaine by the usual procedure for conjunctival anesthesia.

While anesthesia is developing, dip out 2½ or 3 teaspoonfuls of fluid Negocoll into one of the 50-c.c. beakers and test its temperature with the thermometer until it reaches 45°C. The speculum, which has been submerged in 70-percent alcohol for 20 minutes, should be applied at this point and the patient instructed to look at a black spot on the ceiling. By this time the Negocoll should have cooled to 40°C., at which temperature it is ready for use. The aluminum container tube, which has been submerged in 70-percent alcohol for 20 minutes, is then placed upon the eyeball. The cornea should be carefully centered. It is wise to indicate the inner canthus by a red mark on the container tube. Then, while holding the container tube in place, the Negocoll is poured in directly upon the cornea. The tube should be held in place until the Negocoll sets (fig. 2). This requires approximately five minutes. The sense of touch can be quickly trained to estimate the feel of properly congealed Negocoll. The container tube with its solidified content is then removed carefully and immersed in a small beaker filled with cool water. This receptacle should be marked with the patient's name and a sign to designate which eye the mold represents.

In a good mold, the impression of the cornea appears as a sharply circumscribed depression with a shining glass-luster surface. The surrounding area representing conjunctiva is slightly rougher and dull in comparison.

Procedure for making casts: Pour a small amount of cold water, approxi-

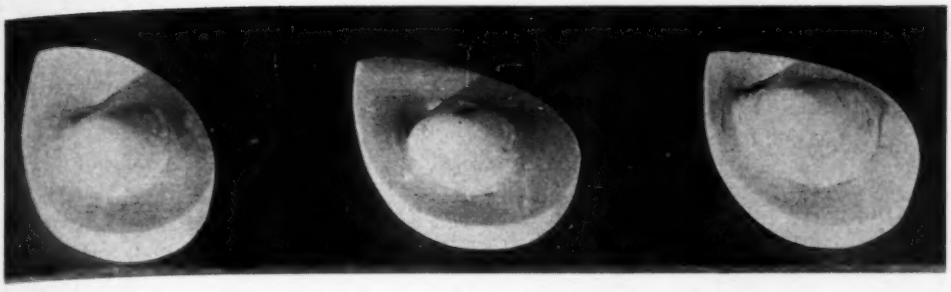


Fig. 3 (Stevens). Showing three casts. From left to right, normal cornea, moderate conical cornea, and marked conical cornea.

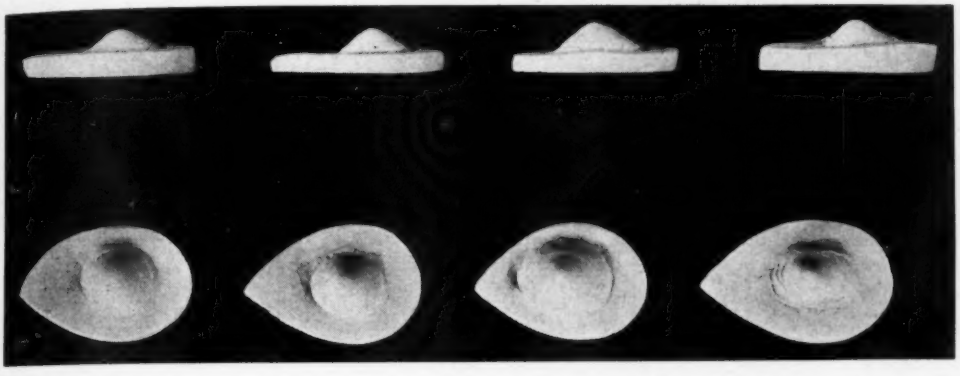


Fig. 4 (Stevens). Same series as in figure 3 with the addition of a fourth cast at the right.

mately 35 c.c., into one of the clean rubber bowls, then dip out French's "Regular" dental plaster with a spatula and sprinkle it into the water until there is a slight film of clear water covering the plaster, which has settled to the bottom. Move the spatula back and forth with a cutting movement as a precaution against the formation of bubbles and mix the plaster into a smooth cream. Pour this fluid plaster into the Negocoll impression slowly, from the side, until it is filled. The remaining plaster is poured out upon the moistened glass plate and pushed into a low mound. The Negocoll mass with its stiffening plaster cast is then slipped out of the container tube, marked to designate the inner canthus, and set, plaster end down, into the waiting mound of plaster on the plate. The surplus plaster all around can be cut away and shaped while the cast is setting. When the plaster is finally hard, the impression is removed, the cast block is trimmed with a plaster knife, and its edges and sides smoothed with fine emery paper.

The appearance of the casts themselves as well as their usefulness in displaying relative degrees of corneal deformity is shown in figures 3 and 4. In figure 5, are shown parallel photographs of the casts and the eyes from which they were taken.

The Department of Ophthalmology wishes to express its thanks and appreciation to Adolph Marfaing for the extraordinarily fine photographs.

One Hundred Sixty-fifth Street and
Fort Washington Avenue.

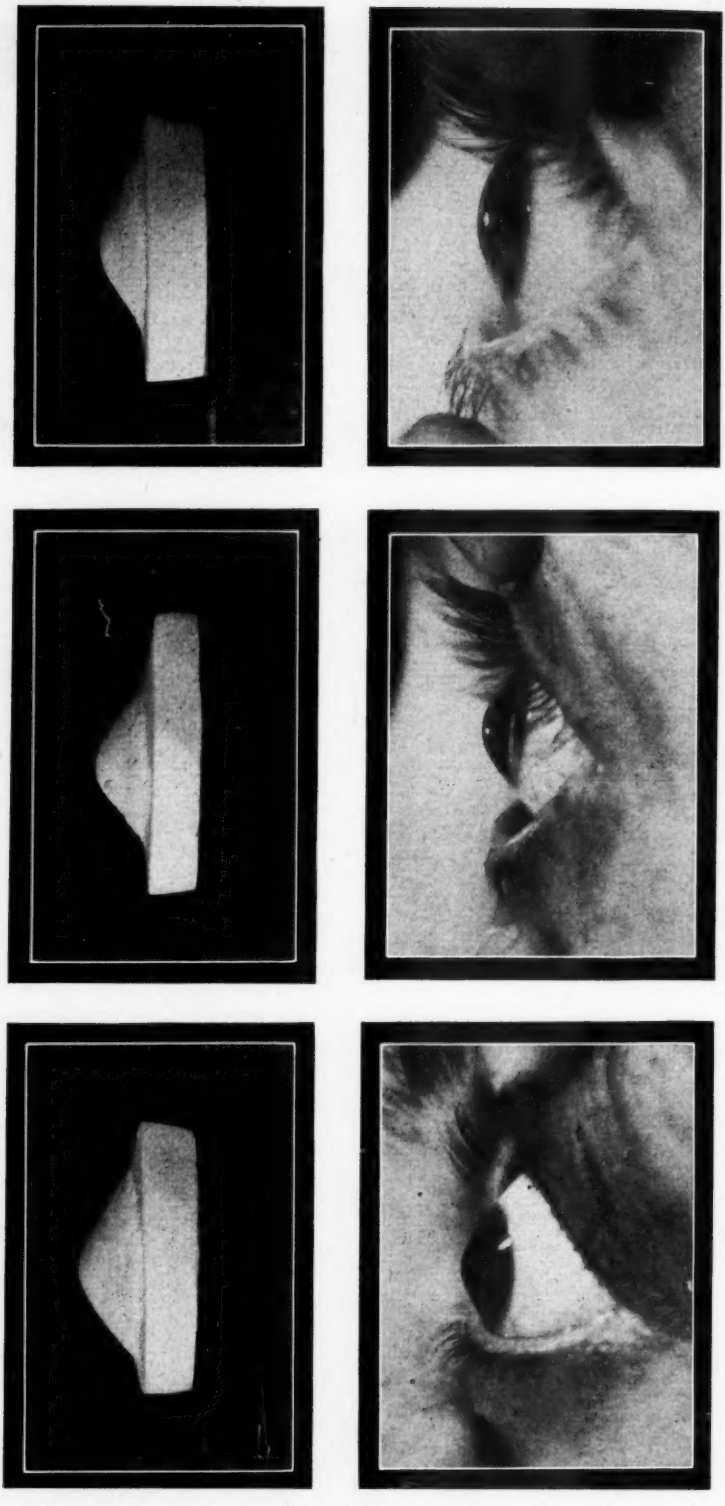


Fig. 5 (Stevens). Parallel photographs of the casts and the eyes from which they were taken.

PTOSIS

Report of a pedigree of four generations of hereditary congenital ptosis affecting only one eye and a pedigree of one generation of congenital ptosis with epicanthus

FRANK H. RODIN, M.D.
SAN FRANCISCO

Although heredity plays an important factor in various eye defects, very little is yet known as to just how these defects are produced. It is by the accumulation of many case histories and records of families having hereditary eye defects that the problems of heredity can be attacked. In this paper is reported a pedigree covering four generations in which there was ptosis of only one eye, the eye affected alternating with each generation; also a pedigree of a family of three children out of six with ptosis and epicanthus, with no ocular defect in any other member of the family. From the Division of Ophthalmology, Stanford University Medical School.

In a previous publication[1] a pedigree of hereditary congenital ptosis was reported and a review of the literature, together with a suggested nomenclature for designating the various types of hereditary and congenital ptosis observed: 1. hereditary congenital ptosis; 2. hereditary ptosis with external ophthalmoplegia; 3, hereditary noncongenital ptosis; 4. hereditary ptosis with epicanthus.

In this article I shall report a new pedigree of four generations of hereditary congenital ptosis affecting only one eye and a pedigree of congenital ptosis with epicanthus.

Hereditary congenital ptosis affecting only one eye

W. M., a male, aged 41 years (table 1, No. 6), gave the following history: His upper right eyelid had drooped all his life. His grandmother (generation I) had drooping of the upper right eyelid; the upper left eyelid was normal. The grandmother had four children (generation II): One son had ptosis of the upper left eyelid and one son had normal eyes. She also had two daughters: One (mother of W. M.) had ptosis of the upper left eyelid and one had normal eyes. W. M. had only one child: a daughter, aged 6 years, who had ptosis of the upper left eyelid.

At the examination of W. M. (fig. 1) the following observations were made: The vision of the right eye was 20/40; of the left eye, 20/20. There was ptosis of the upper right eyelid, the margin of the eyelid reaching about the center of the cornea. There was no paralysis of the superior rectus muscle. The occipitofrontalis muscle functioned normally

Figure 1 (Rodin). Ptosis of an eyelid in a father and daughter. In the father the right eye is affected; in the daughter, the left eye.

and contraction of this muscle elevated the upper eyelid slightly. The left eye was normal upon examination.

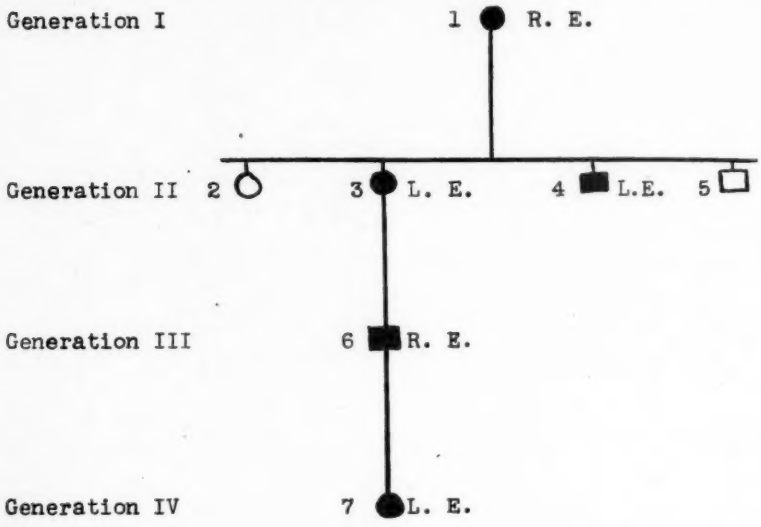
The examination of the daughter resulted as follows: The vision of the right eye was normal; that of the left, reduced. There was ptosis of the upper left eyelid, the ptosis being more pronounced than that of her father. There was no paralysis of the superior-rectus muscle. Contraction of the occipitofrontalis muscle had no effect on the ptosis. There was no tilting of the head backward, which is characteristic of bilateral ptosis.

A new pedigree of hereditary congenital ptosis present in four generations is reported. No generation was skipped. The interesting observation is that only one eye was affected and the eye affected alternated with each gene-

[1] Rodin, Frank H., and Barkan, Hans. Hereditary congenital ptosis. Amer. Jour. Ophth., 1935, v. 18, March, pp. 213-225.

Table 1

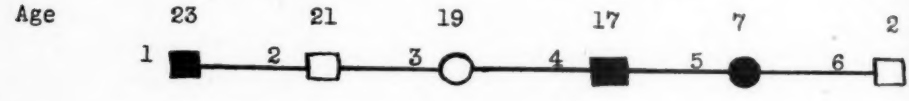
FOUR GENERATIONS OF HEREDITARY CONGENITAL PTOSIS AFFECTING ONLY ONE EYE



□ indicates male; ○, female; ■, male with ptosis; ● , female with ptosis; R. E., right eye affected; L. E., left eye affected.

Table 2

A GENERATION OF CONGENITAL PTOSIS WITH EPICANTHUS



□ indicates male; ○, female; ■, male with ptosis and epicanthus; ● , female with ptosis and epicanthus.

ration. In generation I, there was one female with the right eye affected; in generation II, one female and one male were affected, the left eye in each case; in generation III, there was one male with the right eye affected, and in generation IV, one female with the left eye affected.

Congenital ptosis with epicanthus

I have already fully reviewed the 20 pedigrees of congenital ptosis with epicanthus that have been reported so far.[1]

This is a report of a new pedigree of this condition which occurred in a

family of six children, all living (table 2). As far as could be ascertained there was no eye defect of the mother or father nor of any of their relatives. There are three male and three female children. Two of the males and one of the females show this defect; the other children have normal eyes.

The oldest, a male, was examined, the findings being as follows: The vision of the right eye was 20/40; that of the left eye, 20/20. There was marked ptosis of the upper eyelids with epicanthus. In order to see, it was necessary that the patient tilt his head back about 15 degrees. This tilting of the head is a characteristic of bilateral ptosis. There was good action of the occipitofrontalis muscle. If an effort was made, the eyelids could be raised slightly; their closure was normal. The eyelids were irregular in shape with abnormal distribution of the cilia. The movements of the eyes were normal. There was no paralysis of any other ocular muscle.

Figure 2 shows this patient after he had had a Blascovics ptosis operation on both upper eyelids. There was considerable improvement. Since the operation it has not been necessary for him to tilt his head back in order to see.

Fig. 2 (Rodin). Ptosis with epicanthus. This photograph was taken after a Blascovics ptosis operation had been performed on both upper eyelids. Previous to the operation the ptosis was very marked and it was necessary for the patient to tilt his head back in order to see.

A generation of congenital ptosis with epicanthus is described affecting three of six living children. There is no ocular eye defect in any other member of the family.

Summary

1. A pedigree of four generations with hereditary congenital ptosis affecting only one eye is described.

2. A pedigree of three children out of six with ptosis and epicanthus is reported. No ocular defect was present in any other member of the family.

490 Post Street.

NOTES, CASES, INSTRUMENTS

PARACENTRAL HOMONYMOUS HEMIANOPIC SCOTOMA

F. H. NEWTON, M.D.
DALLAS, TEXAS

A case of paracentral homonymous hemianopic scotoma is of sufficient rarity and interest to justify reporting. Such a condition occurring spontaneously is characterized by (1) sudden onset, (2) field changes consisting of typical, congruous, almost superimposable scotomas, (3) retention of central visual acuity, (4) difficulty in reading due to loss of indirect vision immediately adjacent to the macula,

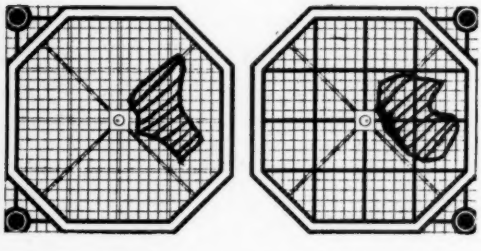


Fig. 1 (Newton). Paracentral homonymous hemianopic scotoma.

and (5) absence of ophthalmoscopic findings if uncomplicated.

Since in most instances the origin has a vascular basis, the sudden onset is to be expected. The patients in the few cases reported were usually past 60 years of age, when cardiac and vascular pathology is common. The lesion is often neither progressive nor regressive. Thrombosis of a small artery in the calcarine region is probably the most usual cause, though an embolus may produce the same result.

As stated, the typical change is a paracentral, homonymous, hemianopic, usually complete scotoma, with the blind area for each eye almost superimposable. This congruity points to a lesion in the posterior part of the geniculocalcarine pathway where vascular changes constitute the chief causal factor involving the visual tract. When the lesions are farther anterior, the homonymous field defects are more likely to be incongruous.

Since the scotoma is paracentral, central vision is left intact. This sparing of the point of fixation brings up again the old controversy concerning the distribution of the macular fibers. Consensus of investigators points to a broad but definite localization of the macula in the visual pathway. A conservative cross section of opinion is probably represented by the position of Duke-Elder. He feels that the cortical representation of the macula is proportionately large and is located at the occipital pole. This representation is very broad but not bilateral. The sparing of the fixation point can be attributed to the broad representation with its double blood supply. The farther back in the visual pathway the lesion is located the more definite is the sparing of the fixation point, which fact, also, indicates that a posterior location of the lesion causes the type of scotoma under consideration.

When the scotoma is on the right, there is difficulty in reading because we fixate the first word or syllable by direct vision and depend on seeing the rest of the word or second word by indirect vision. When the scotoma is on the left, there is difficulty in finding the first word of succeeding lines.

The absence of ophthalmoscopic findings, aside from possible evidence of arteriosclerosis, is, of course, due to the central location of the lesion.

Case report. Mrs. W. H. C., white, aged 66 years, applied for examination on November 25, 1929, complaining of difficulty in reading and worry through fear of losing her sight. In reading there was difficulty in seeing the last part of a word or the next word without fixating each part separately. This condition had developed suddenly a few days before this examination. She had been reading extensively to a sick husband and was worried on account of his physical condition. Direct vision was normal in each eye. Ophthalmoscopic examination was nega-

tive, as was complete physical examination by an internist, with exception of moderate arteriosclerosis. Blood pressure was 130 systolic and 80 diastolic. Field studies showed paracentral scotomas as indicated in the illustration.

Subsequent examination showed no change in direct vision or refraction until November, 1935, at which time there had developed a moderate myopia with chronic uveitis evidenced by a considerable number of vitreous floating particles. No real change occurred in the size of the scotomas over a period of six years. Slight differences are easily ascribed to personal variations of the patient or individual taking the field.

Comment. This case illustrates the importance of being on the watch for such scotomas to explain certain reading difficulties. The prognosis for improvement is not good but may be quite good as far as further loss of vision is concerned. In nontraumatic cases the lesion is usually vascular in origin and often due to a thrombosis in the calcarine area. This patient was seen by Dr. Ernst Fuchs, who ascribed the condition to an arterial thrombosis in the region of the right calcarine fissure.

Mercantile Bank Building.

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THE USE OF CALLAHAN TUBES IN THE TREATMENT OF CHRONIC DACRYOCYSTITIS

CHARLES NELSON SPRATT, M.D.
MINNEAPOLIS

Epiphora due to lacrimal obstruction is often endured for many years; whereas an acute lacrimal abscess or corneal ulcer following injury causes the patient promptly to seek medical aid. Every infected sac is a menace to the safety of the eye, and a slight corneal lesion may become infected. The increased secretion of the lacrimal gland due to the reflex irritation causes a lessened lysozyme content of the tears, consequently the inhibiting action of the latter is diminished and the pneumococcus, frequently present in the sac, becomes the infecting agent.

Many methods have been suggested for the relief of lacrimal stenosis and chronic dacryocystitis. If the obstruction is due to swelling of the lining of the sac following a catarrhal condition, relief may be obtained by irrigation with a mild astringent and antiseptics as suggested by Anel (1712). Such treatment is of little value if a true stricture is present.

Bowman, in 1851, used probes to dilate lacrimal structures. Credit is due Theobald (1877) for the use of large-sized probes. He advocated the number 12 to 14 size (3 to 3.5 mm. in diameter) as measurements showed that in the cadaver the average diameter of 10 adult male lacrimal ducts was 4.47 mm.; one was as large as 7 mm. The persistent use of the large probes will in most cases relieve the stenosis and permit drainage, just as the use of large sounds will relieve urethral strictures. Few patients will spend the time and endure the pain of a course of probing with the Theobald probes.

Lagrange and others have advocated the use of electrolysis to relieve strictures. The negative pole is connected to an electrode in the lacrimal duct and a current of 2 milliamperes is used for 30 seconds. This method is of questionable value and has been adopted by few surgeons.

Incision of the skin and destruction of the sac by means of the actual cautery or by escharotics was suggested by

Celsus (50 A.D.). Harold Gifford opened the sac and destroyed the membrane with trichloracetic acid.

Excision of the sac was suggested by Platner (1724). Berlin, in 1868, reintroduced the operation and the modern method was described by Meller in 1908. Some 25 years ago, I checked the end results of 52 cases in which I had excised the sac. All were free from the infection. Epiphora, on exposure to the cold or wind, was complained of in nearly half the cases. This is as might be expected. With no infection in the lacrimal sac the amount of secretion of the lacrimal gland was slight, but exposure to cold or wind gave rise to a profuse secretion of tears.

Following the publication of the operation dacryocystorhinostomy, by Toti (1909), I followed this method but found that the opening into the nose became closed in many cases. In the Dupuy-Dutemps operation the mucosa of the sac is sutured to the nasal membrane and the opening is likely to be more permanent. My experience was that this was not an easy operation and left a scar, as did also the Toti method.

At the 1910 meeting of The American Ophthalmological Society, Randolph and West reported three cases of dacryocystorhinostomy. The opening in the sac was made from the nose, thus avoiding the external scar of the Toti method. Using the window resection, West reports 90 percent of cures in a large series of cases. Modification of the West operation has been described by Mosher and others.

In 1925, there appeared a paper by John F. Callahan[1] of Brockton, Massachusetts, entitled "Restoration of lacrimal passage after excision of the sac." Since reading that paper, the use of the Callahan tubes has been my only method for treatment of lacrimal obstruction and chronic dacryocystitis. I am not familiar with any other paper on this method.

The use of tubes was suggested by Walthen of England, who, in 1781, proposed the insertion of hollow gold and silver tubes with flat heads to hold them in place. John Green and Moulton (1908) treated strictures by the use of lead stiles, 1 to 2 mm. in diameter. Callahan's contributions to the operation were: 1. The introduction of a soft silver tube with thin walls into the duct on a Theobald or Ziegler probe which served as an obturator; 2. The removal of the tube through the nose by grasping the lower end where it rests beneath the inferior turbinate. In certain cases, an entirely new duct was formed, even after the excision of the sac.

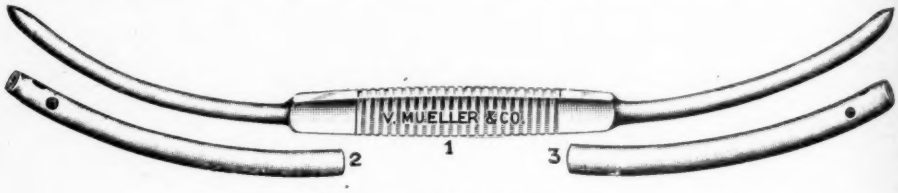

Fig. 1 (Spratt). Callahan tubes.

The operation can be completed under nitrous oxide in from three to five minutes. The lower canaliculus is slit and the lacrimal duct is rapidly dilated with a 3- to 4-mm. Theobald probe (No. 12 to 16). If one objects to slitting the canaliculus the tube may be introduced after the method of Agnew, directly from the conjunctiva through an incision into the lacrimal sac.

In most cases, the cut edges of the canaliculus become united as in any fresh incision; the slitting operation serves only as an opening for introducing the tube. Measurement is made on the probe as it rests on the floor of the nose beneath the lower turbinate so that the upper end in the lacrimal sac is at about the level of the lower canaliculus. The tube is cut to the proper length and a little lubricant is placed

[1] Callahan, John F. Restoration of lacrimal passage after excision of sac. Arch. of Oto-Laryng., 1925, v. 11, p. 127.

on the probe. As this silver tube is no thicker than ordinary paper (the walls being approximately .01 mm. in thickness) the introduction is easy. The Theobald probe is withdrawn; the lower end of the tube rests on the floor of the nose and the upper end is in the sac, slightly below the level of the lower canaliculus. The tube is left in place from six months to one year. One of my patients wore a tube for five years. The removal is easily accomplished: After anesthetizing the membrane of the nose with cocaine, the lower end of the tube is grasped with a slender hemostat. This is rotated on its long axis, and the tube being thin walled and of soft silver is wrapped about the hemostat.

This operation gives the patient relief both from the epiphora and the infection and is quickly and painlessly done. In case the operation should prove unsatisfactory, the tube may be re-introduced. In traumatic obstruction, a new duct can be formed.

I now have records of 65 cases treated by this method, with but three failures. In one, there is entire absence of the infection, but stenosis has occurred at the upper part of the sac. The other two cases were caused by trauma following automobile accidents. All three were so situated that the proper treatment could not be continued.

1231 Medical Arts Building.

OPTOMETRIC PROPAGANDA IN RECENT ENCYCLOPEDIAS

RALPH W. DANIELSON, M.D.

AND

CHARLES E. WALKER, JR., M.D.

DENVER

Recent encyclopedias of American origin have shown a tendency to omit information concerning the medical training, professional services, and equipment of the ophthalmologist and to be misleading as to the scope of the optometrist. The optometrists have advertised themselves so widely and so continuously that the public is confused as to the status of those who professionally deal with eyes. Since there has been no organized attack on the claims of optometrists by the medical profession in the way of a public-education campaign, people in general have been allowed to remain in ignorance. When encyclopedias usually considered to be sources of accurate and unbiased information include the extension of propaganda for the optometrists, it is time that the medical profession take steps to clarify the situation. This is especially true because these books, which allow the ophthalmologist to become the target for the insinuations and, in some instances, purvey false statements by optometrists, fill public, school, and home libraries. Since there is so frequently a confusion in the use of the terms—oculist, ophthalmologist, optician, and optometrist (even among doctors of medicine and of dentistry)—it seems particularly important that these terms be adequately and correctly defined and made available to the public in all encyclopedias.

Our interest in this subject was aroused when each of us looked up these terms in books that we had recently purchased. We found that at least one of the articles on optometry was signed by an optometrist.

The New Standard Encyclopedia, 1935, published by Standard Encyclopedia Corporation, has no article on oculist or ophthalmologist but has a signed article on optometry. We quote it in part. (New Standard Encyclopedia. Systematized Information. Clear Concise Complete. Chicago, Standard Encyclopedia Corporation, 1935, Volume VII):

"Optometry . . . Disease of the eye, as elsewhere is combated by the use of medical or surgical measures. This is the practice of medicine. Many eye ailments, however, are not diseases. They are functional or structural defects and are not subject to treatment by medicine. In fact, by far the greater percentage of eye disorders may be classed as defects rather than diseases. This has been largely responsible for the evolution of the modern science of optometry. . . .

"As the practice of medicine is founded largely upon chemistry, so optometry is based to a great extent upon the science of optics. In 1933 there was no college of medicine in the United States which taught optics. Thus it may be seen that the professions of medicine and optometry are on the whole entirely separate although they overlap at their borders, as do most sciences. . . .

"Prior to about the year 1893 the term optician was used to designate those who corrected defects of the eye by means of glasses. . . . The oculist is a physician who specializes in eye disease; the optometrist specializes in eye defects (including the prescribing of glasses) and the optician fills prescriptions for glasses. The work of each overlaps that of the others, yet each has a distinct field of operation. . . .

"While the optometrist does not treat eye diseases, leaving this medical work to the oculist, he is thoroughly trained to *recognize* eye diseases in order that he may promptly refer to the medical practitioner those cases in which a diseased condition exists. It is at this point that medicine and optometry overlap. Frequently, also, the optometrist refers his patient to the dentist, for many eye conditions result from diseased or faulty teeth."

From the same article in reference to strabismus and orthoptics, we quote:

". . . Glasses will not remedy this condition, properly conducted ocular training will. . . . With very few exceptions, cross eyes can be corrected without the use of surgery. The optometrist *trains** the eyes to desire to straighten and develops the proper muscles to enable them to do so. The surgical method, which until recently was the only known method in many instances, merely straightens the deviating eye by cutting a muscle. It does not train the eye to work with its fellow. Functionally the eye condition is not improved, although it is cosmetically. . . ."

(Signed) Alfred C. Haughton,
Opt.D.

The articles in the other encyclopedias do not contain quite so erroneous statements as the one above, but from the World Book Encyclopedia we quote: (The World Book Encyclopedia. W. F. Quarrie and Company, Chicago. Volume 12, N-O, page 5230.):

"Optometry . . . The word optometry was evolved in order accurately to describe the work of testing the human eye and correcting the defects in eyesight. . . .

"Oculist, a physician who restricts his practice to the eye and its diseases. The amount of his training depends upon his own volition, as no extra examination is required of him after he has received his medical license.

"Optometrist, one able to make a scientific examination of the human eye, without the use of drugs, for the purpose of ascertaining its exact condition and prescribing lenses or prisms for the correcting of such errors of refraction or muscular anomalies as may be found to be present. . . .

"An optometrist is trained to a degree in mathematics and physics, and in practical and theoretic optometry. It is his work to examine the human eye to ascertain its exact visual, and its physical and muscular status. He does this by employing accurate instruments and methods based upon well-known physical and physiological facts. He corrects defective vision by means of lenses, prisms, and eye exercises, and refers diseased conditions to physicians for treatment. He examines the eyes in their living, functioning condition, and carefully differentiates between healthy and diseased conditions."

In the World Book Encyclopedia we find the following in Volume 12, pages 5160 and 5230 respectively:

"Oculist, a term contrasted with optician and optometrist in the article Optometry."

"Optometrist, op tom' e trist, a term contrasted with oculist and optician in the article Optometry."

Neither of the above-mentioned books defines or comments on the term ophthalmologist, and oculist is mentioned only in connection with optometry.

Nelson's Loose Leaf Encyclopedia

* The italics are in the article.

fails to mention oculist or ophthalmologist, but contains a column and a half on optometry. The article in itself is not radical (written in 1914).

The New Columbia Encyclopedia does not mention the subject and therefore avoids the question entirely. Compton's Encyclopedia has very brief definitions in the section "Facts-Index."

If encyclopedias would follow the form of the Encyclopedia Britannica, the profession could raise no objection, although the optometrists might feel offended at the omission of optometry.

We would advise each reader to look up the terms in his own encyclopedia and if the matter is not properly presented to write to the publishing company about necessary changes. It seems to us that it is the duty not only of physicians as individuals, but also of societies, to see that the qualifications of the ophthalmologist as compared to those of the optometrist, are properly presented. This is particularly important when we consider that many optometrists also publish misleading pamphlets deprecatory to ophthalmology.

Furthermore we would suggest that every physician insist upon seeing the definitions of these terms before he purchases an encyclopedia.

Still another term—eyesight specialist—recently coined by light companies, insurance companies, and others, in order to straddle the fence, adds to further confusion in the mind of the public. This term should have our disapproval. There would seem to be no logical objection to the term eye physician for oculist.

In conclusion we would make the following recommendations:

(1) Ophthalmological societies should bring the matter before the American Medical Association in order that action be taken to change the false information and impression created by such articles.

(2) National ophthalmological societies should write to the publishers giving correct information with the request that future volumes be revised.

(3) The profession should buy no encyclopedias edited by these firms until such corrections have been made.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

COLORADO OPHTHALMOLOGICAL SOCIETY

May 18, 1935

Dr. G. H. Hopkins, presiding

Multiple extra- and intraocular foreign bodies

Dr. E. E. Earnest presented a man who had received multiple foreign bodies, consisting of shale coated with hematite, in a dynamite explosion on February 21, 1935. Many foreign bodies were removed from the corneae and conjunctivae of both eyes. There was also a compound fracture of the left hand, and a rupture of the left ear drum resulted in acute purulent otitis media. Two months later the left cornea showed many fine opacities with some staining of the iris, but the healing was sufficient to permit vision of 20/20. In the right iris was a foreign body about the size of a pinhead, another deep in the sclera at the upper limbus, and a very small one in the anterior vitreous. There was also a traumatic cataract in this eye. The foreign bodies did not show in the X-ray film and were nonmagnetic. On April 6th, the foreign body in the iris was removed by an iridectomy. and on April 26th, extracapsular cataract extraction was performed. The scleral foreign body was also removed. At the time of presentation the vision of the right eye was 20/40. Dr. Earnest raised the question of the ultimate outcome. He cited a similar case seen by him two years ago in which the foreign bodies were even more numerous, and in which vision was now 20/15.

Discussion. Dr. W. H. Crisp was of the opinion that the intraocular foreign body might well be tolerated. Further clearing of the cornea with resultant improvement in vision might occur in time. He cited a case seen by him seven years ago in which multiple foreign bodies resulted in 90 percent visual loss, adjudged permanent by the Industrial Commission. Recently it was discovered that the patient had corrected vision of 20/30 and 20/50 as a result of further clearing of the corneae. The case was reopened and disability of 50 percent was allowed. He advised attempting the removal of a few of the corneal foreign bodies at a time.

Dr. E. M. Marbourg cited a case in which the cornea was literally peppered with foreign bodies. After three years' use of dionin the vision improved to 20/40 plus.

Dr. W. A. Sedwick said that the presence of a foreign body in the vitreous complicated the case and demanded a guarded prognosis.

Dr. R. W. Danielson called attention to the possibilities of spontaneous extrusion of corneal and scleral foreign bodies and cited a case in which a piece of quartz, embedded in the cornea and protruding into the anterior chamber, extruded spontaneously in three months.

Dr. G. H. Stine cited a case of spontaneous extrusion of copper wire so deeply embedded in the sclera as to be invisible.

Dr. E. E. Earnest was of the opinion that further attempts at removal of the corneal foreign bodies might cause increased scarring.

Conjunctivities and endophthalmitis following spinal meningitis

Dr. H. S. Rusk presented Violet D., aged six years, who had developed spinal meningitis on April 2, 1935. Spinal puncture showed the spinal fluid to be under pressure and very cloudy. The cell count was 19,850; 84 percent polymorphonuclears. There were intracellular diplococci. Meningococcic serum was given intraspinously at twelve- to twenty-four-hour intervals until 85 c.c. had been given. Steady improvement ensued, but the child continued to complain of photophobia. One week after the last injection of serum, she developed giant urticaria

over the entire body, which was treated with daily injections of adrenalin and with soda baths. During the third week of the illness, marked conjunctivitis with diminished vision developed. The right eye improved with cold boric packs, but the inflammation in the left eye persisted. When seen by Dr. Rusk on April 25th, the left eye was blind; there were purulent conjunctivitis, slightly hazy cornea, and ciliary injection. The pupil was black. The purulent secretion diminished considerably after two days' treatment with mercurochrome, when treatment with atropine and hot packs was instituted. The vision improved to discerning hand movements temporarily, but at the time of reporting vision was nil. The cloudiness of the cornea and aqueous haze had increased, and the pupil was contracted and fixed, but black. The eye was moderately painful and tender, and the other eye was irritable.

Discussion. Dr. W. H. Crisp said that there were nodules on the iris and advised careful testing for tuberculosis.

Dr. G. H. Stine advised strenuous attempts to dilate the pupil, and recommended the use of two-percent suprarenin bitartrate jelly in conjunction with atropine and cocaine. In his opinion the diagnosis was metastatic uveitis and conjunctivitis, and possibly endophthalmitis.

Dr. R. W. Danielson concurred in this opinion and spoke highly of suprarenin bitartrate jelly as a powerful mydriatic. This drug is stable for at least one year in jelly form.

Recurring retinal hemorrhages

Dr. H. S. Rusk presented for diagnosis and prognosis the case of R. M., aged 28 years, who had suddenly lost the vision of the left eye in February, 1934. This was in all probability due to massive intraocular hemorrhage and acute secondary glaucoma. Lack of response to medical treatment and increasing ocular pain necessitated enucleation of the left eye three months later. The vision of the right eye had been poor since January, 1934, with a sudden but transient decrease to 2/20 in August, 1934, and had now diminished to 3/60. This eye had never been painful. Lens changes made fundus examination somewhat difficult. The past history was important. The patient had always been below par physically. He had had scarlatina at the age of three years, chickenpox at four, measles at seven, and pertussis at nine. Both ears had been lanced when he was seven. Tonsillectomy and adenoidectomy had been performed when he was five. Following influenza at 14 years, he had had a chronic cough and expectoration. In September, 1933, complete left hemiplegia developed. This completely disappeared after several weeks' hospitalization. The family history was irrelevant with the exception of gastric carcinoma in the father. There was no tuberculosis. Physical and laboratory examinations were negative except for probable bronchiectasis.

Discussion. Dr. G. H. Hopkins was of the opinion that there were retinal hemorrhages and pigment deposits in the right fundus. He suggested that a blood dyscrasia be considered as a possible etiological factor. Cataract extraction would be attended with enormous risk and should not be attempted at this time.

Dr. J. W. Thompson had seen this patient four years ago, and at that time there were retinal hemorrhages in the right eye with vision of 20/100. The left eye was perfectly normal and had vision of 20/15. Six months later hemorrhages developed in the left fundus; the right eye was unchanged. He considered the condition tuberculous.

Nodular dystrophy (Salzmann) of the cornea

Dr. G. H. Hopkins presented the case of R. M., aged 30 years, whom he had first seen on April 1, 1933. The following history was elicited. At the age of three years, some trouble with the eyes followed measles, and the vision of the left eye was poor. Until two years ago the vision of the right eye had been fairly good, but had failed since that time. Examination when first seen revealed marked infiltration of the superficial and deeper layers of each cornea, the infiltrates taking the form of

nodules extending in an approximately horizontal band across the exposed portion. The nodules were slightly elevated and rather densely opaque. Between them was a finer infiltration and some superficial vascularization throughout the entire cornea, extending inward from the limbus. In the right eye a small central portion of the cornea was relatively less involved and in the left eye there was a fairly clear area in the temporal quadrant. There was no pericorneal injection in either eye. The anterior chambers were both slightly deeper than normal. The pupils were equal and responded well to light. A hazy view of the right fundus could be obtained, and it seemed to be normal. The left fundus could not be seen.

On April 1, 1933, the vision of the right eye was 20/60 and could be improved to 20/30 with correction. At the present time the vision of the right eye was 20/96, and with correction 20/75 plus. Two years ago the vision of the left eye had been 10/150, and could not be improved by lenses. At the present time the vision of the left eye was unchanged. The corneal involvement in the right eye had increased in both extent and depth during the past two years; the condition of the left eye had remained about the same.

The general physical examination and blood Wassermann test were negative. Various therapeutic measures had been tried, the eyes being kept under atropine for a long period with apparently no benefit. Pilocarpine had also been used for some time, and some improvement appeared to result from this drug. No effect was noted from the use of dionin, nor had a high vitamin-A diet been of any apparent avail.

Discussion. Dr. V. H. Brobeck said that Dr. Karl Lindner had recommended the use of Lugol's solution in the treatment of nummular keratitis.

Dr. D. G. Monaghan suggested the use of quinine bisulphate.

Dr. E. M. Marbourg suggested the use of thyroxin as described by Jameson.

Dr. W. H. Crisp was of the opinion that curettage of one of the peripheral nodules and application of tincture of iodine should be tried.

Orbital tumor, fatal termination, autopsy

Dr. G. H. Stine reported further notes in the case of orbital tumor which he had presented at the meeting on October 20, 1934, and December 15, 1934. Following a total exenteration, which was done on November 9, 1934, the patient rapidly lost ground and finally died on March 31, 1935. There had been no recurrence of the orbital tumor, but at autopsy both lungs were found to be riddled with various-sized, hard, white, metastatic nodules, which also involved the visceral and parietal pleura. The left apex was a solid tumor mass, and this lesion appeared to be much older than the others. Two of the lower intercostal nerves were enmeshed by a large nodule close to the vertebral column; which accounted for the persistent pain in the left hip prior to death. A pathological diagnosis of the metastatic nodules was round-cell sarcoma. No metastases were found in any other part of the body.

George H. Stine,
Recorder.

BALTIMORE CITY MEDICAL SOCIETY

Section of Ophthalmology

December 10, 1935

Dr. William M. Rowland, chairman

Hyaline membranes on the posterior surface of the cornea with especial reference to congenital types

Dr. Clyde A. Clapp showed slides of several of Miss Ida Mann's cases of this very rare condition, and added one of his own. In typical cases the membrane is translucent and always located peripherally, with marked variations in width, sometimes extending over the greater portion of the posterior surface of the cornea, as it did in the left eye of Dr. Clapp's patient. Associated with the condition are vessellike bands of heavily pigmented fibrous tissue coursing over the iris. In Dr. Clapp's case

the membrane occurred in both eyes. The left eye was smaller than the right and the substantia propria, slightly cloudy. In one of Miss Mann's cases there was also a one-sided microphthalmos. Dr. Clapp was inclined to disagree with Miss Mann's opinion that the condition is a developmental anomaly. He believes a prepartum inflammation to be a more likely cause.

Discussion. Dr. Alan Woods stated that the association of the condition with microphthalmos added weight to the developmental theory of the etiology.

Dr. Jonas Friedenwald asked what change the slitlamp revealed in the normal appearance of the posterior layer of the cornea.

Dr. Clapp said that the membrane was so dense that the endothelial cells could not be seen by specular reflection.

The surgical treatment of detachment of the retina

Dr. Jonas Friedenwald reported on his personal experience with operations for detachment of the retina during the last five years. During this period 67 cases of detachment had been seen for the first time. Of these, four were due to choroidal tumors; 19 were of long standing and were regarded as inoperable; one occurred during pregnancy and made a spontaneous recovery; in one case of myopia with a large retinal tear recovery occurred under medical treatment; in the remaining 42 cases, operations were advised; in 33 cases operations were performed, 11 times with success.

The age of onset of detachment was studied in the whole group and it was found that when correction was made for the distribution of age groups in the general population there was a steady increase in the incidence of detachment with advancing years, the relative frequency being 12 times as great for persons over 60 years in comparison with persons under 20 years. A similar analysis in relation to refraction showed no difference in the incidence of detachment among emmetropic and hyperopic eyes but an increasing incidence with increasing myopia, the relative frequency for myopia above six diopters being 30 times that for emmetropic eyes.

The operative series was too small for a critical analysis of the relative merits of different types of operations, but within these limits it appeared that diathermy with the Walker needles was more successful than the Gonin, Larsson, or Guist operations. One half of the operations by the Walker method resulted in cures, whereas one quarter of those by the other methods were successful. Long-standing detachment, high myopia, advanced age, and numerous holes all were found unfavorable for a successful result. Only one out of five cases of aphakia was cured. If the macula was detached for over one month, normal visual acuity could not be expected, but detachment of the retina up to three or four months did not militate against surgical cure.

Mary L. Small,
Secretary.

ROYAL SOCIETY OF MEDICINE, LONDON

Section of Ophthalmology

January 10, 1936

Mr. Ransom Pickard, president

Laurence-Moon-Biedl syndrome

Mr. Leslie Paton presented two brothers showing this condition. These patients had been seen by Mr. Paton for the first time only a few days previously, and a full investigation was to be made later. The father, mother, and all their near relations were normal. The other two children were a girl aged 11 years, and a 7-year-old boy, both said to be normal as to appearance and vision.

The elder boy of the two now shown was aged 14 years; his vision was no more than 6/60. He had vertical nystagmus which was not increased on lateral or vertical deviations, but the oscillations became more rapid when attempts were made at ophthalmoscopic examination. When the boy was excited, occasional head-nodding was noted. The pupillary reactions were normal. Ret-

inal defects were certainly present, but ophthalmoscopic examination was very difficult. The boy showed the characteristic marked obesity. The little finger of his left hand seemed to have one carpal bone missing, and the fingers tapered. The toes were normal in number but the three outer toes on each foot were shortened. The palatal arch was very high.

The younger boy was 12 years old; he had similar very defective vision and a nystagmus mainly horizontal, or oblique, with a rotational element in it. It was very irregular in incidence, more definitely accompanied by head-nodding than in the case of his brother. His pupils were active. There were obvious retinal defects, mental backwardness, and obesity. He had six toes on each foot.

The disease is familial. The primary disturbance must occur, Mr. Paton considered, very early in fetal life, and probably starts with a disarrangement of genes: both epiblastic and mesoblastic structures are involved. The visual disturbance is varied in character, but always retinal in origin. The fovea may, in some, be the area most affected, and the change may vary from slight macular stippling to large macular colobomata. The retina may be affected generally and may show all types of gradation from slight retinal atrophies with but little pigment disturbance to conditions which could well be described as typical retinitis pigmentosa. Hence night-blindness is not uncommon. Nystagmus is not universally present in these cases; it is more likely to be observed in cases in which the macular defects predominated. In Willi's cases nystagmus was present, and the macula lutea was said to be undeveloped; the sella turcica was enlarged, and dark adaptation and color vision were very defective. There were in those cases webbed fingers and toes. Moran considered these cases to be due to intrauterine syphilis occurring very early in fetal life, and he persisted in that view even in the face of a negative Wassermann test. In the British Journal of Ophthalmology of February, 1935, Sorsby drew attention to the association of macular colobomata with skeletal defects. Weill and Sayeur found an increase in the anterior pituitary hormone, and a deficiency in both the posterior-lobe hormone and the testicular hormone. For these reasons, efforts at treatment had been focused on the sellar region. Mr. Paton, however, thought that, though all the cases show evidence of hypopituitarism, the primary defect must date back to the beginnings of fetal life and must be due to disturbances in the relationship of the genes in one or more chromosomes.

Discussion. Mr. Arnold Sorsby said there is no basis for the view held by Bailliart that the lesions in these cases are of congenital origin. The vast majority of the cases are familial; that is, more than one child in a family is affected: it is a recessive condition. So far, the number of cases published is 108. Consanguinity was present in 33 percent, a very large proportion, considering that among the general population consanguinity is present in only one half of one percent. With regard to the fundus appearance in these cases, it is not so varied as Mr. Paton indicated in his remarks, for they all fall into the group of pigmentary degeneration of the retina. In some this is confined to the macular region, while in others it may involve the periphery also. What Mr. Paton referred to as colobomata are really stages in that degeneration. Optic atrophy is always present in these cases, but requires some time to become established.

Detachment of the retina in eclampsia

Mr. J. H. Doggart said that the renal system is seriously impaired in many cases of eclampsia, and that other organs than the kidneys are affected. Extensive edema of the retina has been seen in eclamptic patients whose renal efficiency was not reduced; hence, it is not surprising that the fundus picture in eclampsia can differ so much from that expected when retinal changes are associated with chronic nephritis. Four points of distinction must be emphasized regarding the retinal detachment associated with eclampsia: (1) rapidity of onset, (2) abundance of the sub-

retinal fluid, which may push the retina right forward without folds, so that its appearance is that of a full-blown sail, (3) the fact that extensive bilateral detachment may occur with little or no hemorrhage or exudate on the surface of the retina, (4) the good prognosis.

Schiötz investigated ophthalmoscopically 6,800 pregnant or puerperal women, including 132 with cases of eclampsia. Only seven showed retinal detachment, and in three of them there was no evidence of retinitis. Of these last three, two had unilateral cases, and the detachments continued years afterwards; in one bilateral case there was a quick recovery. Clapp reported six patients with retinal detachment in eclampsia, all of whom recovered good sight and had normal visual fields. Six of the seven cases of eclamptic detachment recorded by Schiötz were in primiparae. On the other hand, Mr. Foster Moore noted that multiparae were more liable than primiparae to the retinitis of pregnancy.

About five years ago Mr. Doggart saw, several times, a patient who manifested some of the typical features of eclamptic detachment, but he had not seen a case of it since. This woman was 26 years of age, a primipara. She had had two convulsions soon after admission to the hospital, and the subcutaneous tissues all over the body were intensely edematous. Surgical induction a few days later resulted in a still-born fetus within 24 hours. Two days later she was comatose and difficult to examine. There was a right upper retinal detachment which was very dark and came forward into the vitreous. In the left eye the detachment was mainly above; no hemorrhage nor exudates were seen. The right eye was divergent. Her systolic blood pressure at this time was 210. A week later the right detachment had subsided, leaving only a moderate amount of myopic pigmentary degeneration at the macula. In the left eye the detachment was now much smaller and confined to the lower portion. At the end of another week, the retina of the right eye was back in position. The left detachment was still smaller, and the hemorrhages in this retina were rapidly diminishing. A fortnight later the hemorrhages had been entirely absorbed, and only a very small shallow detachment remained, in the lower part of the left retina. Soon afterwards the left retina was completely back in its normal position, and simply showed a few scattered pigment spots, such as are seen mostly as a sequel to any variety of retinal detachment. With her right eye she was able to see part of the 6/12 line with a —11.0 D.sph. The left vision was 6/6 unaided: visual fields were full.

Discussion. Mr. F. W. Law said it would be interesting to know, in view of the peculiar changes, whether Mr. Goulden or others had considered the possibility of this detachment being a phenomenon secondary to a choroidal exudate, and, therefore, occurring in a different anatomical plane from that of the detachments seen having holes in the retina.

Mr. Doggart, in reply, said that he had never read nor heard of a case of this kind in which there was a hole in the retina: but there was mention of holes in a paper of composite authorship in Germany. There was, however, no supporting case description. With such a rapid and extensive exudate it would not be surprising if holes did happen, especially in people having a retina that was thin at the periphery.

(Reported by H. Dickinson).

CHICAGO OPHTHALMOLOGICAL SOCIETY

December 16, 1935

Dr. Robert Blue, president

Juvenile hereditary degeneration of the macula

Dr. Bertha Klien presented a 31-year-old man who complained of gradual impairment of the central vision of both eyes during the past three years. One of the patient's brothers, now aged 33 years, had similar complaints, which had begun at the age of 12 years. Neither man complained of hemeralopia. No other family history could be obtained. The patient's corrected vision

was 8/200 O.D., 4/200 O.S. The peripheral fields for form and color were very slightly contracted, somewhat more so in the left eye. There was a 20-degree absolute scotoma for white in the right and a 25-degree in the left eye. The fundus examination revealed in both eyes macular lesions consisting of discrete, reddish, sharply defined areas of irregular shape with some pigment accumulation in the foveal regions. There were also peripheral changes in both eyes, consisting of rows and groups of small reddish or yellowish flecks, many of them with an ill-defined, slate-gray center. In a few rather peripheral places there was a coarser, dark-brown pigmentation. The disc and retinal blood vessels were normal. The choroidal vessels showed some sclerosis in the periphery. The lenses were clear. The general physical examination revealed no pathologic findings.

The fundi of the patient's brother had almost identical lesions. The familial occurrence and also the appearance of the fundus lesions suggested a tapeto-retinal degeneration. The macular lesions alone were typical of those classified by Behr as infantile, juvenile, presenile, and senile hereditary degenerations. They may be stationary or progressive and are not associated with hemeralopia, the only subjective symptom being a central scotoma. The discs and retinal vessels are usually normal. The unusual feature in this case was the association of the macular lesions with the peripheral fundus lesions, which do not seem to be accidental findings of a chorioretinitis as both brothers show them, but rather also degenerative manifestations.

Glaucoma without hypertension

Dr. Carl Apple presented a man, 41 years of age, first seen on September 30, 1935, with complaint of blurring of right vision at times. The right disc was pale and had a large cupping with one vessel hooking over sharply at the disc margin at the 11-o'clock position; the left disc showed a physiologic cupping. Several fields were taken and showed contraction of form and marked contraction of the red fields; a central scotoma was continuous with the blind spot. The left fields showed moderate contraction of form and red fields. The fundi were studied while the pupils were dilated with homatropine. No elevation of tension occurred. The right eye was atropinized for 10 days and tension checked daily, the average for 15 tensions being O.D. 22.4, O.S. 14.4 mm. Hg. The blood Wassermann was negative. The X-ray film revealed no pathology of the sella or carotids. Intraocular retinal arterial tension (Bailliart) was systolic 90, diastolic 40 mm. Hg. The slitlamp disclosed no evidence of anterior pathology. Redfree light showed no macular pathology.

On the basis of these findings it was concluded that this was a case of an arrested glaucoma or glaucoma without tension.

Discussion. Dr. Hallard Beard added that the principle of the measurement of intraocular blood pressure was to obtain a measure of the intraocular arterial blood pressure by exerting pressure on the eyeball simultaneous with the observation. The eyeball is compressed to a certain point which will equal the diastolic blood pressure, then the arteries of the fundus will collapse in diastole, and by a table which has been computed, taking into account the intraocular pressure, it can be ascertained.

Plastic operation on a shrunken socket

Dr. M. L. Folk said that this patient had had her right eye enucleated at the age of five years and had been wearing a prothesis until about one year ago. She was then confined to the hospital with a general ailment during which time she left out the prothesis. There was marked shrinking of the socket and no prothesis could be inserted. Three attempts were made to enlarge the socket by incisions, insertion of the prothesis or a glass ball and suturing of the lids. On each occasion the prothesis was extruded after 10 days or two weeks. Last August, under general anesthesia, all the scar tissue within the orbit was excised and a large dermal graft taken from the thigh, wrapped around dental

molding compound, and inserted into the orbit. The graft took en masse and the patient has been wearing a prothesis since that time. The only objection is an occasional odor which has responded to potassium-permanganate irrigations.

Discussion. Dr. Sanford Gifford remarked that if patients were taught to wipe away the dead skin thoroughly with a wooden applicator, the odor could be eliminated.

Operation for muscle paresis

Dr. Thomas D. Allen said that this 11-year-old boy was first seen July 8, 1935, in consultation. In January, 1931, he had had a carbuncle on the upper lip, streptococcic infection with meningitis, and had been semiconscious for two weeks. There was no control of the eyes and eyelids. The right eye recovered, but the left eye had turned in ever since. The left eye abducted only to within 30 degrees of the midline. Vision was good with weak minus spheres.

On July 9, 1935, under general anesthesia the left internal rectus was recessed 3 mm. and the left external rectus was resected 10 mm. and advanced. Also, the outer half of the superior and inferior recti was tunneled to the externus and fastened thereto (the superior rectus was weak, the inferior rectus strong). Slight apparent over-correction was obtained. At this time the cosmetic result is excellent. The left eye is in primary position, the left caruncle, slightly shrunken. The left eye turns down over 50 degrees, in 25 degrees, up 40 degrees, and out 18 degrees of arc.

Mooren's ulcer

Dr. Thomas D. Allen said that this man, 65 years of age, had complained of redness and pain in the right eye for the past three years, worse in the past 18 months, with photophobia, tearing and secretion. The blood vessels to the corneal lesion had been divided three times, about six months ago, and the patient had been treated with serum and ultraviolet rays. At first there had been some improvement, then the condition became worse. The eyelids had always been "granulated" and red. The right lids were red and thickened and the lashes sparse. The lid and bulbar conjunctivae were red up to the limbus. Nasal to the cornea a yellowish layer of tissue containing blood vessels, arising in the conjunctiva and crossing the limbus from the 2- to the 5-o'clock position, covered the nasal third of the cornea. At the margin of this was an overhanging edge under which a probe could be passed for 2 mm. Fluorescein caused no staining, but the corneal surface was irregular and very thin near the edge of the growth. The temporal half of the cornea was clear. No increase in cells in the aqueous was seen and the iris was normal; tension was normal; lacrimal canals were patent; and culture of the conjunctiva was negative. A diagnosis of Mooren's ulcer was made and radium treatments were given. The eye gradually became less red; pain, photophobia, and secretion disappeared, and the cornea became more even. The patient was now comfortable.

Bilateral disseminated exudative choroiditis: congenital anomaly of right external rectus

Dr. R. O. Riser said that this 12-year-old girl came to the Research Hospital in July, 1935, with a complaint of having been cross-eyed since infancy. There were no other ocular complaints, and general and family histories were negative. Examination showed alternating convergent strabismus of 55 degrees in the primary position with inability to abduct the right eye past the midline. There was no change in the angle of squint in the primary position under atropine. Ophthalmoscopic study revealed media clear, discs negative, vessels normal; but the entire fundus of each eye, peripheral and central, was found to be studded with yellow flocculant areas, ranging from the width of a blood vessel to one-half disc diameter in size, some being discrete, many being confluent, and all lying under the retinal vessels. While several of the larger areas in each eye, especially in the right, appeared to be slightly depigmented no areas of hyperpigmentation were found. Physical ex-

amination, Kahn test and blood cholesterol tests were negative. The mother, sister, and two brothers have normal eyegrounds. The muscle condition was considered to be a right abducens paralysis, but in operating for the squint, exploration of the external rectus of the right eye revealed a congenital anomaly: a well-developed muscle was found to be attached 12 mm. posterior to the limbus. An adhesion between the external rectus and the sclera, about 18 mm. posterior to the limbus, was found and freed. The attachment was advanced 8 mm. and the internal rectus was tenotomized. There is now a residual convergence of 30 degrees with or without glasses. The fundi after three months' observation show no new yellow areas, but below the previously described area of depigmentation in the right fundus is a similar area grayer in color than the surrounding tissue, which may be the manifestation of a tendency toward hyperpigmentation. There are no definite black pigment spots in either fundus. The fields show a concentric contraction of 30 degrees in the left eye and an eccentric contraction in the right eye to 30 degrees temporally and 45 degrees nasally. There seems to be no hemeralopia.

Differential diagnoses should include tapetoretinal disease (diffuse), retinitis pigmentosa sine pigmento, coalescent forms of retinitis punctata albescens, and juvenile drusen.

An analysis of recent studies on the etiology of trachoma

Dr. Phillips Thygeson read a paper on this subject which will be published in this Journal.

Discussion. Dr. Sanford Gifford said that the question of inoculation with filtrates had never been thoroughly settled until this work was done. There had been some reports of positive inoculations and other reports of negative inoculations. Dr. Thygeson had proceeded with a new method of filtration and was able to produce inoculation with filtrates, as shown. Then he had studied the other virus diseases and pointed out the differences and similarity between the diseases he was studying and the other virus diseases. Most convincing was a look at Dr. Thygeson's own conjunctiva about two years after he had inoculated it with a filtrate from inclusion blennorrhea.

Dr. Gifford himself had been interested in the question of these inclusion bodies and believed that they were not specific for trachoma or inclusion blennorrhea, because they were so difficult to find in trachoma and very few cases of inclusion blennorrhea were seen in Omaha; in fact, none in which the inclusions could be found. Following some work with Dr. Lazar five years ago, it was thought that such bodies could be produced by chemical irritants in animals. On treating the conjunctivae of babies with similar irritants, bodies were found which were pronounced by a number of people to be identical with the inclusion bodies of trachoma and inclusion blennorrhea. Since Dr. Thygeson's work, this research had been reviewed, and in a later series of babies it had been impossible to reproduce these bodies by chemical irritants. It was therefore concluded that the three babies in whom the bodies were found must have had inclusion blennorrhea in latent form or were carriers of the virus. Then, with Dr. Tilden, an effort was made to produce inclusion blennorrhea in the sphinx baboon with filtered and unfiltered material, which was successful. In a few experiments with material from trachoma, no results were obtained. However, with a satisfactory source of material, possibly the same results as those of Dr. Thygeson will be obtained.

Dr. Hallard Beard said that in Vienna, in 1927, Dr. Lindner had some interesting things to say about trachoma. He believed firmly in the venereal origin of trachoma and succeeded in enlisting the interest of some gynecologists and urologists, and obtained scrapings from the urethra, cervix, and the genital tract which contained these inclusion bodies. Lindner further believed that inclusion blennorrhea and trachoma, however similar, were not one and the same disease, from some evidence which was purely clinical. He inoculated some old chronic

trachoma patients, in whose case no further damage could be done (those with pannus, etc.), with material from inclusion blennorrhea. A new disease was superimposed on the old one, and it ran a course and then disappeared. A similar report was made in regard to an old trachoma case in which an accidental inoculation with gonorrheal blennorrhea was effected. After it ran its course the signs of trachoma had disappeared. He held to the theory that both trachoma and inclusion blennorrhea are originally venereal diseases. Inclusion blennorrhea is still a venereal disease, although it is more or less passive in the genital tract. In the eye it is an acute disease. Trachoma has undergone some evolutionary changes and has become exclusively an eye disease, and while related to inclusion blennorrhea, is still a separate entity, and is to be considered similar to, but not identical with inclusion blennorrhea.

Dr. Phillips Thygeson (closing) said that both Cuénod in Tunis and Busacca in Brazil have reported minute Rickettsia-like bodies in the follicles. Cuénod may have mistaken protoplasmic debris for Rickettsia. Attempts to demonstrate such bodies in the follicles have so far been unsuccessful, in this work; possibly the virus does not penetrate the epithelium. Follicle formation occurs in bacterial conjunctivitis in which the bacteria do not penetrate the epithelium. We know that atropine and eserine catarrh may result in follicles. There is no direct evidence as yet to indicate that the trachoma virus is subepithelial. In fact, in experiments in which the trachomatous material has been introduced through the skin of the lid, no infection has occurred. Present evidence is suggestive that the virus has affinity only for the epithelium and that it produces subconjunctival damage through soluble toxins.

His understanding was that, according to Lindner's original idea, the two diseases are identical; Lindner then modified it, since inclusion conjunctivitis healed so rapidly, and now feels that they are related but nevertheless distinct. He thought there was some cross immunity on inoculations of baboons. It is now known that trachoma does not leave any immunity; a monkey can be reinoculated indefinitely upon healing. The same is true of inclusion conjunctivitis in monkeys. Right now we have no way of knowing whether the viruses are related or whether they are entirely different. In reply to Dr. Lazar, the same thing had been noted; no trachoma has been seen in the American Negro, but severe cases of inclusion blennorrhea and also inclusion conjunctivitis have been found. We have no way at present of showing similarity or difference.

The treatment of trachoma

Dr. A. F. Lenzen and Dr. H. S. Gradle read a paper on this subject which will be published in this Journal.

Discussion. Dr. Harry Gradle added one comment. Dr. Gamble asked last fall at the Academy as to why these forms of treatment were used, which take a longer period of time than copper sulphate and silver nitrate. It was found that the end results were more satisfactory than with other treatment; there was less scar formation in the conjunctiva and particularly in the tarsus; and many of the complications so disastrous in trachoma were avoided.

Tarsectomies were not performed in these clinics because of the disastrous effects observed in the past among the Indians of the Southwest, by Dr. Wilder and Dr. Procter. The operation was discontinued by government order because of the poor end results.

Dr. A. F. Lenzen (closing) in reply to Dr. Von der Heydt, said that atropine was used for corneal infiltration. No bacterial examination was made. One of the sacs removed was sent to Dr. Theobald, but no report has been received as yet.

Robert Von der Heydt.

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EDITORIAL STAFF

LAWRENCE T. POST, Editor
640 S. Kingshighway, Saint Louis

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Address original papers, other scientific communications including correspondence, also books for review and reports of society proceedings to **Dr. Lawrence T. Post, 640 S. Kingshighway, Saint Louis.**

Exchange copies of medical journals should be sent to **Dr. William H. Crisp, 530 Metropolitan Building, Denver.**

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CILIARY-BODY SURGERY

The ophthalmic surgeon is disposed to fear traumatism involving any part of the uveal tract, but above all he dreads injury to the ciliary body. The introduction of surgical cyclodialysis for glaucoma has taught us at least that the ciliary body may be separated from the sclera with conspicuous danger. All of us know, moreover, cases in which the ciliary body has been penetrated or lacerated without serious late developments. After cyclodialysis, the operative region may for a time remain sensitive, yet eyes upon which this operation is performed do not show severe cyclitis, and there is no record of such an operation leading to sympathetic inflammation of the other eye.

Blaskovics (Zeitschrift für Augenheilkunde, 1936, volume 88, page 75) points out that in cases of sympathetic ophthalmia following cataract operation we are not usually dealing with direct injury to the ciliary body, but rather with incarceration of parts of the uvea. Consideration of the injuries frequently survived by the ciliary body, and of the circumstances under which cyclitis and sympathetic ophthalmia arise, leads Blaskovics to argue that resection of a piece of the ciliary body is not necessarily a hazardous undertaking.

It has been considered good surgery to trim away ragged ciliary-body tissue before inserting a scleral suture for repair of a lacerating injury. But more than this is sometimes necessary in order to avoid incarceration, and Blaskovics urges that there is good ground for occasional removal of a small strip of uveal tissue beneath the sclera. He recites several cases in which such a procedure appeared necessary and in which it proved intrinsically harmless or even in some cases

beneficial, although in others the general circumstances led to loss of the eye.

In the first case X-ray examination indicated the presence of a foreign particle resting upon the ciliary body beneath a scleral wound. Enlargement of this wound failed to disclose the foreign body, and the vitreous was exposed by excising a piece of the ciliary body with scissors. The foreign body ultimately proved to be in the eyelid. Three and a half years later the vision of the eye was one third, in spite of a large detachment of the retina which had lasted for two weeks soon after the injury. An interesting observation was that the accommodation of the eye was not reduced.

In another case, with laceration and iris prolapse, the use of a conjunctival apron after iris excision failed to prevent the onset of septic endophthalmitis. Roentgenography demonstrated a very small foreign body in the anterior vitreous. The particle was removed after the conjunctival flap had been pushed back and a piece of the ciliary body excised. Although the vision fell from one fourth to one thirtieth, it had risen to two thirds twenty-two months later.

A laceration produced by an exploded bottle, and extending from the limbus to beyond the equator on the temporal side, showed prolapse of parts of the retina, ciliary body, and choroid, with escaping vitreous and hemophthalmos. After excision of uveal tissue, the scleral lips were united and covered with a conjunctival flap. Two months later the eye had vision of two thirds and was free from irritation.

The technique which Blaskovics describes for cyclectomy includes: preparation of a tangential conjunctival flap in which catgut sutures are inserted; if necessary a meridional incision to half the thickness of the sclera; insertion of scleral sutures of horse hair, by means of which the scleral wound is made to gape; separation of the ciliary body with a cyclodialysis spatula for two or three millimeters on either side of the wound, and thereupon resection of the exposed part of the ciliary body with scissors; where called for, removal of a nonmagnetizable foreign body with forceps with the aid of diascleral transillumination from the opposite side; looping and tying of the scleral sutures, which are then carried through the conjunctival flap at some distance from the part that is to cover the scleral wound, and again tied; and final tying of the catgut sutures previously inserted in the conjunctiva.

Provided there is no incarceration of uveal tissue, excision of a piece of the ciliary body appears to be as well tolerated as excision of iris. Apart from the direct risk of infection incidental to all lacerating injuries, Blaskovics urges that infection is no more to be feared from cyclectomy than from removal of an iris prolapse. Escape of vitreous must of course be restricted as far as possible.

The indications for cyclectomy are stated to be first, scleral rupture with uveal prolapse, and second, preparation for removal of nonmagnetizable foreign bodies in or beneath the ciliary body.

W. H. Crisp.

VITAMIN-A DEFICIENCY

Early experiments with vitamin A indicated its importance in ophthalmology. Extensive studies have been made on the effect of a vitamin-A-deficient diet on animals. Most obvious has been the production of keratomalacia, which could be overcome if vitamin A were added to the diet before the disease was too far advanced. Keratomalacia became common during the war because of the limitation of such foods as butter and cream. It was noted that those suffering from this dietary deficiency were afflicted with night blindness which was relieved by supplying the proper vitamin.

It naturally follows that in those diseases in which night blindness is an important symptom a vitamin-A deficiency might be suspected.

Because of these associations, studies

of the relationship of dark adaptation and vitamin-A deficiency are of especial interest to eye physicians. In the March 24, 1934 issue of the Journal of the American Medical Association, Doctors P. C. Jeans and Zelma Zentmire described a photometer test for dark adaptation which they thought might be useful in detecting vitamin-A deficiency Subjects with impaired dark adaptation were restored to normal by consuming vitamin A.

A later study was made on urban, village, and rural school children by these same workers and reported in the March 21, 1936 number of the Journal of the American Medical Association, on page 996. The results are very interesting.

Four hundred and four children were examined from February to April in 1934. Twenty-six percent of the rural group and 53 percent of the village group were found to have definitely subnormal dark adaptation. In the urban group (from a city of 150,000 population) the proportion in the upper economic level was 56 percent, at the middle level 63 percent, and at the lowest level 79 percent. No relationship appeared to exist between vitamin-A deficiency and either age or sex.

The percent of deficiency was so large that it was thought wise to check it by giving foods rich in vitamin A for a few weeks and then to repeat the test. Accordingly, halibut-liver oil or carotene in oil was administered each day by the school teachers. Of the 78 children who were thus treated only three failed to attain normal dark adaptation. The reason for the failure in these three was not obvious. Their eyegrounds were normal. It might be noted that they did not like foods rich in vitamin A. The great majority attained a normal adaptation after one month during which they took the equivalent of three teaspoonfuls of cod-liver oil daily. No difference between the effectiveness of vitamin A and carotene was noted.

Previous studies of this character have been made but with somewhat different results.

That such marked deficiencies should be found in apparently healthy children is surprising. It seems definitely to indicate the advisability of cod-liver oil or similar vitamin-A-rich foods during the winter months. It suggests furthermore, that dark-adaptation tests should be made in ocular degenerations and that in case of diseases associated with night blindness vitamin A should be administered.

Lawrence T. Post.

BOOK NOTICES

Detachment of the retina. Operative technique in treatment. By J. Cole Marshall. Oxford University Press, 1936. Cloth covers, 80 pages, price $2.75.

Each monograph on retinal detachment passes out of date almost as soon as written, because so many new ideas are added almost monthly. This book brings the subject of operative treatment to date. It is very clear, concise, and convincing. The figures are well selected and adequately illustrative. Only eight pages are devoted to the diagnosis and preliminary measurements. Even in an article restricted to the operative treatment, the necessity of greatly stressing the search for the underlying cause of the detachment is indicated; for unquestionably many surgical failures are due not so much to poor technique as to the persistence of the underlying pathology.

The methods chiefly described are those of Gonin, Lindner-Guist, Larsson, Weve, Safar, and Vogt. The details, advantages, and disadvantages of all of these are considered. After-treatment is discussed in full.

The book will be of interest to anyone who performs operations for retinal detachment. It is reasonably complete and probably presents as much of detail as is warranted in the changing picture of the surgery of this at one time nearly hopeless condition.

Lawrence T. Post.

The Tadhkirat of Ali ibn Isa of Baghdad. Memorandum book of a tenth-century oculist. A translation by Casey A. Wood. Published by The Lakeside Press, R. R. Donnelly &

Sons Company, Chicago, 1936. 232 pages, illustrated, paper covers, price not stated.

This translation of the books of this ancient ophthalmologist presents the most interesting of the early writings on ocular subjects that the reviewer has encountered. The present translation is a compilation of previous translations by such authors as Hirschberg, Hille, Pansier, and others rather than from the original Arabic. Dr. Max Meyerhof of Cairo, who has had great experience in Arabic, aided in the interpretation of difficult passages. The introductory chapters present various commentaries on the memorandum book, a discussion of five centuries of Arabian authors and their treatises on ophthalmology, and the biography of Ali ibn Isa and a prefatory address.

Three books of the Tadhkirat have been translated in part. To attempt a detailed consideration of these would be impossible. The anatomy although far from accurate, nevertheless contains many reasonably correct elements. Physiology, however, lags far behind anatomy. The optic nerve, for example, was supposed to be hollow to transmit the element of sight to the brain, sight being considered as something which flowed out from the eye and returned to it again.

The bulk of these books consider the subject of therapy. The list of drugs is appalling in length and composition. Much stress is laid on the so-called temperaments; that is, coldness, warmth, moisture, dryness, and combinations of these.

This is a book to be read at leisure and enjoyed. Each page contains matters of interest. In one paragraph the surprise will be at the good sense expressed and in the next paragraph at the absurdity of the concept. We recommend the book to all booklovers, and especially to those who are interested in the contributions of the past to the present.

Lawrence T. Post.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, history
19. Anatomy, embryology, and comparative ophthalmology

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10. RETINA AND VITREOUS

Uyama, Yasuo. **The relation of the pecten in coloboma of the optic nerve as well as its genesis and function in the normal eye of the bird.** Graefe's Arch., 1936, v. 135, p. 240.

In a blind incubated fowl, the pecten was displaced and attenuated. The pecten arose from the canal of the optic nerve, which on one side presented a cyst adjoining the sclera. The pecten was composed of blood capillaries, connective tissue, pigmented cells, and a covering of glial tissue. The basic substance of the pecten was directly connected with the choroid through the optic nerve canal.

After puncture of the anterior chamber, the author found that the intraocular tension returned to normal in 45 to 50 minutes. The blind eye with coloboma of the optic nerve was enucleated sixty minutes after paracentesis. Sections presented congestion in the blood vessels of the choroid but no fluid infiltration or vesicle-formation in the epithelium on the ciliary body or on the pecten. The author concludes that in the bird after sudden and large loss of intraocular fluid its replacement occurs for the most part from the choroid, and that the nutrition of the vitreous in a physiologic state is apparently from the pecten. H. D. Lamb.

Uyemura, M. **The blood pressure in the capillaries of the macular region.** Klin. M. f. Augenh., 1936, v. 96, March, p. 324.

After discussing the literature, Uyemura reports investigations on one hundred persons. He used the ophthalmodynamometer of Suganuma for observation of entoptic phenomena of the blood circulation. As a basis he chose the time at which the entoptically visible blood circulation was suddenly retarded, and by calculation he converted the dynamometer pressure at that time into the simultaneous blood pressure, obtaining an average of 28.9 ± 0.2878 mm. Hg. Almost all subjects manifested pulsatory acceleration of the motion of entoptically visible light points in the visual field. The light points are the interstices between the erythrocytes. The capillaries filled with blood plasm collect the light by cylindric action on the visual cells. (Illustrations.) C. Zimmermann.

Viner, K. G. **Coats's exudative retinitis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 256.

A patient 42 years of age appeared in the clinic complaining of loss of vision in his one eye. The fundus picture was typical of Coats's exudative retinitis

and there were cholesterin crystals also in the iris and vitreous. General examination and biopsy of subcutaneous fat revealed a disturbance in fat metabolism and necrosis of the fatty tissue. The visual improvement under treatment was insignificant. Ray K. Daily.

Walker, C. B. **Treatment of the flat type of separated retina and of macular hole, with special devices and modifications.** Amer. Jour. Ophth., 1936, v. 19, May, pp. 392-399; also Trans. Amer. Ophth. Soc., 1935, v. 33, p. 48.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Durando, Francesco. **Retrobulbar optic neuritis from sinusitis and accommodative asthenopia.** Riv. Oto-Neuro-Oft., 1936, v. 12, Sept.-Oct., pp. 675-701.

The writer reports on five patients between 40 and 67 years, two female, affected by retrobulbar neuritis from old sinusitis with no pus or evidence of inflammatory conditions. Central vision, visual fields for form and colors, and the blind spot were variously affected. Some complained of accommodative asthenopia which was not correctable by glasses, and others of recurrent intense headache. The following conclusions were reached: Rhinogenous retrobulbar neuritis has no clear and constant symptomatic picture but accommodative asthenopia is an important symptom of this form of neuritis, which etiologically does not depend only upon a lesion of the optic nerve in its course in the optic canal but also in its course in the orbital fat. Surgical treatment was found the best for improving the eye symptoms. (Bibliography, 14 figures.) M. Lombardo.

Fischer, Franz. **Differential diagnosis between pseudoneuritis and papilledema or optic neuritis.** Zeit. f. Augenh., 1936, v. 88., March, p. 303.

The author reports three cases of disc anomaly, two of them in brothers, in which the differential diagnosis between pseudoneuritis on the one hand and papilledema and optic neuritis on the other hand was difficult. Roentgenologic findings suggested intracranial pressure. The two brothers had large cranial volume and deep digitate impressions. The third patient had hydrocephalic dilatation of the capsule and increased digitate impressions. The condition persisted unchanged for a long time. It is possible that these patients actually had had intracranial pressure. The author quotes Pick, who in 1904 suggested that pseudoneuritis might be actual papilledema remaining unchanged for a very long time, and also a personal communication from A. Fuchs, whose father assumed that a patient had pseudoneuritis because the lesion remained unchanged for years and yet later believed that he had been mistaken because the disc became entirely normal. F. Herbert Haessler.

James, R. R., Thomson, St. C., Colledge, L., and Hodgson, H. G. **A case of acute unilateral retrobulbar neuritis associated with nasal sinus disease.** Brit. Jour. Ophth., 1936, v. 20, March, p. 164.

A man aged 72 years had suppuration in the left antrum which was drained through a molar tooth socket. Three years later he had sudden loss of sight in the left eye. The field was full except for a slight contraction in the upper nasal quadrant and a large central scotoma. Roentgenograms showed thickening of the lining of the left antrum, frontal sinus, and posterior ethmoid cells. The left sphenoid showed a fluid level. Five days later the sphenoid and ethmoid were drained. No improvement in vision resulted. This route of infection was apparently direct through the wall of the sinus into the optic nerve. The fellow eye remained healthy. D. F. Harbridge.

Kaplan, J. D. **The action of akrichin.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 73.

The author calls attention to the green vision not infrequently encountered in cases of akrichin intoxication. Akrichin is a synthetic antimalarial preparation manufactured and widely used in Russia. Ray K. Daily.

Krimsky, Emanuel. **Transitory choked disc; report of a case with an eleven-year follow-up study.** Arch. of Ophth., 1936, v. 15, Jan., pp. 36-39.

Bilateral papilledema in a boy aged nine years suddenly disappeared three months after onset of symptoms. Repeated examinations during the following eleven years have disclosed normal vision and fundi. There is no explanation of the sudden recession. The mechanism of papilledema is discussed and illustrated by drawings.

J. Hewitt Judd.

Kyrieleis, W. **Observations on choked disc.** Graefe's Arch., 1936, v. 135, p. 100.

Swelling of the papilla without increase of intracranial pressure may arise through venous stasis, through abnormal permeability of the vessel wall from vasomotor or osmotic disturbances, or through stasis of tissue fluid; hence from predominantly passive factors located in the eye. Papilledema from increase of intracranial pressure is due to an active force lying outside the eye.

In dogs, ligature of the optic nerve in the cranial cavity just behind its exit from the bony canal caused no clinical or anatomic changes in front of the site of the tying. In monkeys, constriction of the optic nerve in the orbit behind the entrance of the central vessels caused a mild increase in volume anterior to the ligature, and at the papilla a mild fading of the margins without any prominence but once a delicate sheathing of the veins. When the constriction occurred in monkeys around the part of the nerve containing the central vessels (always the vein more than the artery), the swelling of the nerve anterior to the ligature was usually more definite, the haziness of the papillary margins was pronounced, and hemorrhages occurred at the margin of the papilla. A knob-shaped prominence of the papilla alone was never observed.

H. D. Lamb.

Lapidus, A. M. **Green vision in cases of akrichin intoxication.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 79.

A woman handling the product during its preparation suffered intoxication by akrichin (a Russian antimalarial drug). Among the symptoms were yellow discoloration of the skin and green vision. Whether the chromatopsia is due to irritation of the retinal elements or to discoloration of the transparent ocular media remains to be determined by experimental studies.

Ray K. Daily.

Liorber, G. S., and Kolenko, A. B. **Pigmentation of the optic disc.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 929.

A description of two cases. (Illustrations.) Ray K. Daily.

Mann, Ida. **A theory of the embryology of oxycephaly.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 279.

In oxycephaly or tower skull the vertical measurements of the skull are abnormally large, and the transverse and anteroposterior measurements abnormally small. In all cases the salient features are failure of expansion of the skull base, and the upward compensatory growth of the vault. Rickets, premature synostosis, syphilis, fetal meningitis, and prenatal osteitis have been some of the etiologic factors named. From embryologic study the author argues that the primary anomaly is failure of the lower part of the skull to expand, and she places the defect primarily in the mesoderm. (6 illustrations.) Beulah Cushman.

Paton, Leslie. **Papilledema and optic neuritis; a retrospect.** Arch. of Ophth., 1936, v. 15, Jan., pp. 1-20.

The mechanism of papilledema and the histopathologic changes producing the various findings in the fundus are discussed, and are clearly illustrated by drawings and photomicrographs. The discussion of optic neuritis is limited chiefly to the types produced by neurotropic viruses which attack primarily the myelin sheath. These are disseminated sclerosis, acute disseminated encephalomyelitis, acute ascending myelitis (Devic's disease), and diffuse periaxial encephalitis (Schilder's disease). J. Hewitt Judd.

Piekarska-Maczyneska, M. **Two cases of a rare congenital anomaly of the optic nerve.** Klinika Oczna, 1935, v. 13, pt. 2, p. 288.

A review of the literature accompanies report of two cases of congenital atypical excavation in the temporal portion of the optic disc, described by the Germans under the name of "Grubenbilding." (Illustrations.)

Ray. K. Daily.

Pilman, H. I., and Taradina, H. A. **The effect of carbon monoxide poisoning on the eye.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 5, p. 903.

In a case of chronic monoxide poisoning, the ocular symptoms included constriction of the visual fields, disturbance in dark adaptation, and xanthopsia in the peripheral field. The last symptom was brought out at the perimetric examination, in which beyond twenty percent white was seen as yellow. The patient was observed for seventeen months, during which time this unusual symptom persisted. He had yellow discoloration of the sclera and a very high bilirubin-blood content.

Ray K. Daily.

Purtscher, Ernst. **Peculiar tumor of the optic disc.** Zeit. f. Augenh., 1936, v. 88, Feb., p. 217.

The author describes a small globular mass on the optic disc, having one-half the diameter of the disc. Vessels were seen on the surface, and some of them disappeared in its substance. Synchronously with the retinal venous pulse the mass became pale, and by pressure on the globe it could be made anemic. In discussing the differential diagnosis, the author mentions inflammatory masses and various neoplasms which have been reported in the literature, but he comes to no definite conclusion. F. Herbert Haessler.

Saveliev, S. V. **Involvement of the eye in intoxication with plasmocide.** Sovietskii Viestnik Opht.. 1936, v. 8, pt. 2, p. 224.

A report of 19 cases of optic neuritis or atrophy associated with symptoms of a toxic encephalitis and edema of the brain caused by administration of this antimalarial remedy. Ray K. Daily.

Selinger, E. **Protein content of the aqueous in the diagnosis of choked disc and papillitis.** Arch. Neur. and Psychiat., 1935, v. 33, Feb., p. 360.

The albumen content of the aqueous is determined by the trichloracetic acid method. In seven cases of papilledema the albumen content was 0.02 percent or less. In papillitis of inflammatory origin, the albumen content was 0.04 to 0.1 percent; in papillitis of non-inflammatory origin, 0.03 to 0.04 percent. Theodore M. Shapira.

Springowitsch, Gertrud. **Further observations on treatment of optic atrophy with retrobulbar injections of atropin.** Klin. M. f. Augenh., 1936, v. 96, March, p. 342.

The majority of cases were treated with retrobulbar injections of 0.5 c.c. of atropin solution 1 to 1000, nine cases with one percent acetylcholin 1 c.c., and two cases with padutin 1 c.c. Atropin was best. Vision rises after the first injection, which acts beneficially on the psyche of the patient. The result in the majority does not depend on etiology. With few exceptions the injection is well tolerated. In no case was deterioration of vision noticed during treatment, and in the great majority the results remained unchanged (during two to four years observation). The favorable results are ascribed to vasodilator action of atropin and the subsequent active hyperemia, stimulating the still living nerve fibers to better function. (Illustrations.) C. Zimmermann.

Van Heuven, J. A., and Fischer, P. F. **The water-binding of the optic nerve and of its sheaths.** Brit. Jour. Ophth., 1936, v. 20, April, p. 204.

This investigation was along the lines of Fischer's previously published reports on the retina (see Amer. Jour. Ophth., 1935, v. 18, June, p. 590, and July, p. 673). Small pieces of optic nerve were placed in distilled water, or in water containing acids, solutions of various salts, acetone, or concentrations of urea. The capacity and intensity of water-binding by the optic nerve is much greater than that of the retina, and is of a different type. The water-binding conditions in the sheaths of the optic nerve are as in the sclera. The

clinical significance of water-binding by the optic nerve and its sheaths is discussed and some remarks are made on theories of the genesis of papilledema.
D. F. Harbridge.

Vidaur, Miguel. **A case of Paget's disease with bilateral optic atrophy.** Arch. de Oft. Hisp.-Amer., 1936, v. 36, Jan., pp. 1-17.

The author discusses briefly the etiology, pathogenesis, symptomatology, and treatment. (Bibliography, 6 illustrations.) R. Castroviejo.

12. VISUAL TRACTS AND CENTERS

Brons, C. **A case of successful operation for parasagittal meningioma of the left parietal lobe.** Klin. M. f. Augenh., 1936, v. 36, Feb., p. 166.

A man aged 27 years complained for several weeks of headache and impairment of vision with obscurations, convulsions mostly of the right side of the body, and loss of consciousness. He showed nystagmus and choked discs, the left disc being more prominent. From this and weakness of the right side of the body a tumor of the left parietal region was diagnosed, although even ventriculography did not permit exact localization. Under local anesthesia after luminal preparation a meningioma, that is, a benign endothelioma apparently starting from the dura, was removed. It was adherent to the longitudinal sinus, which had to be repeatedly opened. Vision was R.6/7, L.6/15 after five months, although in the meantime distinct signs of optic atrophy had set in. C. Zimmermann.

Filippi-Gabardi, Eugenio. **Contribution to the study of cortical blindness.** Riv. Oto-Neuro-Oft., 1935, v. 12, Sept.-Oct., pp. 627-646.

A woman of seventy years became suddenly blind in both eyes with motor deficiency of the limbs and left face, but without loss of consciousness. The motility of the left limbs was slowly regained. Previous examination had revealed a relative central scotoma for colors at the left, and sclerosis of the retinal vessels. Postmortem examination revealed sclerosis of the cerebral arterial system, spots of calcification in the basilar trunk, total occlusion of the posterior cerebral arteries by a thrombus, and softening of symmetrical zones of the median-posterior portion of the occipital lobes. (Bibliography, 3 figures.) M. Lombardo.

Gordon, Alfred. **Visual field defects as a deciding diagnostic factor in lesions of temporal lobe simulating cerebellar involvement.** Jour. Nerv. and Mental Dis., 1935, v. 82, Oct., p. 394.

Three cases are reported in which there were symptoms of increased intracranial pressure with a number of symptoms referable to cerebellar involvement. The symptoms were, however, irregularly distributed on both sides of the body. Studies of the visual fields were of diagnostic value in localizing the lesions in the temporal lobe.
Edna M. Reynolds.

Groff, R. A. **Syndrome of meningeal fibroblastoma arising from lesser wing of sphenoid bone.** Arch. of Ophth., 1936, v. 15, Feb., pp. 163-184.

Five additional cases of this syndrome are reported in detail and are discussed together with four previously reported cases. The additional cases emphasize the signs previously described and present additional symptoms and signs such as sensory disturbances in the distribution of the trigeminal nerve, uncinate fits, exophthalmos, and erosion of the lesser wing of the sphenoid bone. The author advocates a lateral approach to the tumor, since it allows exposure of the portion which is in the middle fossa and permits easier removal of the dural attachment. J. Hewitt Judd.

Hare, W., Magoun, H., and Ranson, S. W. **Pathways for pupillary constriction.** Arch. Neur. and Psychiatry, 1935, v. 34, Dec., p. 1188.

There are synapses in the path for pupillomotor reflex in response to light, located in the pretectal region, but these particular cells cannot be identified. Constriction of the pupils in cats was due to stimulation of efferent fibers of cortical origin. Theodore M. Shapira.

Harris, W. **Fibers of the pupillary reflex and the Argyll Robertson pupil.** Arch. Neur. and Psychiatry, 1935, v. 34, Dec. p. 1195.

There is no conclusive evidence to explain the normal consensual pupillary reaction to light.

Theodore M. Shapira.

Marquis, D. G. **Phylogenetic interpretation of the functions of the visual cortex.** Arch. of Neur. and Psychiatry, 1935, v. 33, April, p. 807.

Marquis states that in evolutionary development from the fish to man a complete reorganization of the central visual system has taken place. This has not appeared suddenly but can be traced by gradual stages in the intermediate animals. Within the mammalian series there is progressive shifting of visual functions from the superior colliculus to the striate cortex. Recognition and localization of objects by form, size, position, and so on, is a spatial perception depending on appreciation of the distribution of excitation over the surface of the retina The evolutionary change characterized by progressive shifting of functions from the subcortical to the cortical level has merely progressed farther in the visual system than in the somatic sensory system. Theodore M. Shapira.

Penfield, W., Evans, J. P., and MacMillan, J. A. **Visual pathways in man with particular reference to macular representation.** Arch. of Neur. and Psychiatry, 1935, v. 33, April, p. 816.

The authors present five cases from which they deduce the following: excision of the posterior portion of the temporal lobe produces complete interruption of the geniculocalcarine fibers and homonymous hemianopsia with splitting of the macular field. Complete removal of one temporal lobe may produce, in addition to the above, spontaneous habitual deviation of the eyes and head to the side of the removal.

Removal of a large portion of the occipital lobe results in homonymous hemianopia with sparing of central vision. The authors conclude that there is a tract of fibers subserving macular vision which leaves the inferior longitudinal fasciculus after rounding the ventricle and turns mesiad and anteriorly. Their evidence strongly supports the theory that this tract passes to the visual cortex of the opposite hemisphere by way of the splenium.

Theodore M. Shapira.

Riddoch, George. **Visual disorientation in homonymous half-fields.** Brain, 1935, v. 58, Sept., p. 376.

Two cases of brain tumor in the left parietal lobe with disorientation in the right homonymous half-fields are reported. In one case, the only impairment of the field was enlargement of the left blind spot. Localization and estimation of distance were faulty in the right half-fields. The second patient showed right homonymous hemianopia with gross defects of localization and of estimation of distance in the right half-fields. Both patients were unaware of any visual defect, because of retention of central vision.

Visual disorientation may occur when association pathways from the visual cortex to other parts of the brain are interrupted, and so far as is known the nodal point appears to be in the supramarginal and angular gyri of the parietal lobe. Edna M. Reynolds.

Scala, N. P., and Spiegel, E. A. **The pupillary reactions in combined lesions of the posterior commissure and of the pupillodilator tracts.** Arch. of Ophth., 1936, v. 15, Feb., pp. 195-216.

Studies of the effects of producing in cats combined lesions of the posterior commissure and central pupillodilator tracts indicate that, whereas unilateral severance of the posterior commissure induces mydriasis and diminution but not loss of light reflex on the same side, the combined lesions produce a slight miosis of the homolateral pupil and diminish without abolishing the dilator response of the corresponding pupil. On the basis of these experiments it is assumed that a lesion of the synapse between the afferent and efferent parts of the pupillary light reflex arc best explains the symptoms of the Argyll Robertson pupil. J. Hewitt Judd.

Scullica, F. **Visual function and glycides of the occipital lobes of the rat.** Ann. di Ottal., 1936, v. 64, Jan., p. 50.

Researches by various authors have clearly demonstrated that the activity of the central nervous system is associated with a local diminution of the glycides. The author determined the relative glycide (amino-acetic acid) content in the cerebral substance of the visual area of the occipital lobe of normal as compared with artificially blinded rats. In the latter, after five days' suppression of the visual function the proportion of glycin was found greater than in normal animals, whereas after 122 days of blindness and consequent inactivity of the visual area the glycin was found markedly less than normal, showing indirectly the importance of the afferent fibers of the retina on glycide metabolism in the brain, and the influence of this metabolism on the cortical visual elements. (Bibliography.) Park Lewis.

Vampré, Enjolras. **Optico-chiasmal arachnoiditis.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 16-35.

The author describes three cases, the first traumatic, the other two probably of infectious origin, from an unknown neurovirus. In two cases there seemed at first good ground for respective diagnoses of cerebral tumor and retrobulbar neuritis. But the rapidly beneficial results obtained by deep radiotherapy pointed to an arachnoiditis. The physiology of the hypothalamic region is discussed in detail. The author favors radiotherapy, which he suggests should be employed as a preliminary treatment in every case presenting a syndrome of cranial tumor. He further recommends sodium salicylate administered intravenously. W. H. Crisp.

Weed, L. H. **Certain anatomical and physiological aspects of the meninges and cerebrospinal fluid.** Brain, 1935, v. 58, Sept., p. 383.

Evidence is given that the cerebrospinal fluid is secreted by the choroidal plexuses and that the major part of the fluid is absorbed directly into the venous system through the arachnoid villi. The physical forces underlying the normal process of absorption of cerebrospinal fluid are shown to be all accounted for by the total effective pressure, the hydrostatic pressure-difference between the subarachnoid space and the cerebral venous system plus the colloid osmotic pressure of the blood.

Alterations in the general posture of mammals are found to affect the mechanism of absorption by dislocation of the cerebrospinal fluid within the dural sac. Because of the elasticity of the intradural contents, however, no special mechanism of adjustment for the hydrostatic column of cerebrospinal fluid has been developed in mammals with erect posture.

Edna M. Reynolds.

13. EYEBALL AND ORBIT

Arkin, Wiktor. **An unusual combination of developmental disturbances.** Klinika Oczna, 1935, v. 13, pt. 2, p. 331.

Under the title of quadrato-cephalosyndactyly the author describes the case of a six-week-old infant with numerous congenital defects. The ocular anomalies were entropion of the upper lids, epiblepharon, epicanthus, microphthalmos, and atresia of the lacrimal duct. Congenital entropion of the upper lids is very rare, only two other cases being reported in the literature.

Ray K. Daily.

Bietti, G. B. **The pathologic adiposis of the eyeball with special regard to that consecutive to severe endobulbar inflammatory processes.** Boll. d'Ocul., 1936, v. 15, Jan., pp. 1-66.

The writer describes the histologic and the histochemical findings in twenty eyes enucleated for severe old lesions of inflammatory or degenerative type, and in three eyes affected by xanthomatosis bulbi. The fatty substances were not clinically visible in the former group of eyes but they were visible in the other group. Qualitatively, however, these substances were analogous in the two groups. In adiposis they arise from nutritive changes and a degenerative process in local tissues and

exudates, while in the other group of cases they are infiltrative products of elements which reach the eye with the blood stream. (Bibliography, 33 figures.) M. Lombardo.

Bucalossi, Antonio. **Clinical and pathologic contribution to the study of orbital tuberculoma.** Ann. di Ottal., 1936, v. 64, Jan., p. 39.

The tuberculoma occurred in a woman of 47 years who had previously suffered from bilateral exudative pleuritis. Bucalossi offers the hypothesis that the condition in this case may have been due to direct action of the organism, and in others to the toxic action of the filterable virus of the tubercle bacillus. (Plate, bibliography.)
Park Lewis.

Bushmitsch, D. G. **The etiology of enophthalmos and retraction movements of the eyeball.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 43.

Three cases of this congenital anomaly are reported. In one the author attempted surgical correction and found the rectus internus inserted abnormally far forward, and the externus consisting of a thin fibrous band.
Ray K. Daily.

Hanson, W. A., Fowler, L. H., and Bell, E. T. **A case of Schüller-Christian's disease under observation for nine years.** Amer. Jour. Cancer, 1935, v. 25, Dec., p. 768.

The authors report a case of Schüller-Christian's disease in a 59-year-old female. Without radiotherapy, the case has remained practically stationary. An enlarged axillary lympth node removed nine years ago was mistaken for metastatic carcinoma.
Theodore M. Shapira.

Hippert, François. **Two cases of intermittent exophthalmos. Orbital varicocele.** Arch. d'Opht., 1936, v. 53, Feb., p. 135.

Ninety-one cases of this rare disease have been reported in the literature. The author adds two more cases. A man aged 36 years, giving no history of trauma, had intermittent exophthalmos of the left eye of 7 mm. appearing fifteen seconds after bending his head forward. A man aged 21 years with no history of trauma showed exophthalmos of the left eye of 11 mm. after muscular effort or bending his head forward, appearing within sixty seconds. The author discusses at length etiology, pathologic anatomy and physiology, symptomatology, complications, diagnosis, and therapy. He considers the treatment of choice to be sclerosing injections of quinine-urethane, because surgery might induce air embolus. (Bibliography.) Derrick Vail.

Jaeger, de. **Dermoid cyst with cranial malformation.** Ann. d'Ocul., 1936, v. 173, Jan., pp. 31-33.

A boy aged fourteen years presented a tumor of the left temporal region, adjacent to the orbit. This tumor was soft and was adherent to the bone. A definite depression in the bone could be felt at the site of attachment. X-ray examination showed a defect in the lesser wing of the sphenoid. The tumor was excised and the marginal walls of the bone defect were curetted. The excised mass was a dermoid cyst containing sebaceous material. (Drawing and roentgenographs.) John C. Long.

Jenkins, W. H. **Exophthalmos of obscure nasal origin.** Ann. of Otol., Rhinol., and Laryngol., 1935, v. 44, March, p. 279.

Jenkins reports six cases and says that in all cases of orbital edema careful and repeated examination of the sinuses should be made. Obscure lesions in the posterior ethmoid and sphenoid region may produce circulatory disturbances in the orbit which closely simulate cavernous sinus thrombosis. If seen before orbital abscess occurs, a large percentage may be permanently relieved by local treatment or by a minor intranasal procedure.
Theodore M. Shapira.

Kaganova, O. A., and Cherni, L. I. **Bilateral exophthalmos in osseous xanthomatosis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 261.

A report of a case of Schüller-Christian syndrome in which the process was

arrested by roentgenotherapy. (Illustration.) Ray K. Daily.

Lyle, D. J., and McGavic, J. S. **The cause of voluntary forward luxation of the eyeball.** Amer. Jour. Ophth., 1936, v. 1, April, pp. 316-320.

Nakamura, B., and Nakamura, O. **The distribution of vitamin C in the interior of rabbits' eyes.** Graefe's Arch., 1936, v. 135, p. 87.

The different portions of rabbits' eyes were tested for their content of vitamin C by the Kotake-Nishigaki method. Vitamin C occurred in greatest amount in the pupillary portion of the iris. The ciliary part of the iris and the ciliary body contained less but still a considerable amount of vitamin C.
H. D. Lamb.

Neuman, Jacob. **Lid and eyeball prothesis after Lauber-Henning.** Klinica Oczna, 1935, v. 13, pt. 2, p. 321.

The artificial eyeball of glass and the artificial lids of soft material are pasted on daily to the orbital margins and produce a satisfactory cosmetic effect. This prothesis was made for a case of complete destruction of the eyeball and lids by a caustic burn. Ray K. Daily.

Porto, Gabriel. **Reasons for a diagnosis of thrombophlebitis of the cavernous sinuses.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 108-113.

Replying to a criticism by Busacca, the author defends his diagnosis in a case already reported as one of thrombophlebitis of the cavernous sinus, but which Busacca suggested was more probably one of cellulitis. The author feels that his diagnosis is not contradicted by the fact that the patient lived four months without external appearance of the suppuration.
W. H. Crisp.

Poulard, A. **Scleral insertion of solid spheres and ovoids.** Ann. d'Ocul., 1936, v. 173, Feb., pp. 120-132.

Poulard sutures a glass ovoid into the scleral cavity. Sclera and conjunctiva are closed with interrupted sutures. In 190 cases there were 28 failures (extrusion of the glass). Thirty-three operations were done for panophthalmitis, and twelve of the failures were in this group. In performing this operation for nineteen years the author has seen no case of sympathetic ophthalmia following it (6 illustrations.)
John C. Long.

Rintelen, F. **Morphology and genesis of the malformations in microphthalmos.** Graefe's Arch., 1936, v. 135, p. 120.

A microphthalmic eye was removed from a two-months-old infant, otherwise normal. Clinically a glioma of the retina could not be excluded. When the eye was sectioned, two genetically different kinds of defect in development could be sharply distinguished. First, there were primary idiokinetic defects which can be divided into faulty development, syngenetic malformations, and those due to retardation of growth. The only example of the first subdivision in this case was the formation of deep grooves or furrows in the corneal epithelium. Syngenetic malformations explain all the changes in the lens upon the basis of hypertrophy of the capsulohyaloideal membrane resulting from persistence of the hyaloid artery. Defects due to retardation of growth are persistence of the hyaloid artery and the pupillary membrane. The second principal kind of fault in development is found in primary hypertrophic defects and those of dystopia. An example of each in this case is the formation of folds in the region of the macula and the dystopic development of retinal tissue in the vicinity of the ciliary processes. H. D. Lamb.

Rumiantzeva, A. F., **Prothesis of the orbit.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 89.

At the Kiev Institute for Individual Prothesis, established by the Red Cross of the Ukraine, the author uses artificial eyes, wax, a plastic compound, and hair for making prothesis to correct orbital deformities. Wherever possible the prothesis is held in place by the bony margins of the orbit. Ray K. Daily.

Schneider, R. **Prostheses over unsightly eyes.** Illinois Med. Jour., 1935, v. 68, Oct., p. 349. (See Amer. Jour. Ophth., 1935, v. 18, June, p. 555.)

Urrets Zavalia, A., Balado, M., and Obregon Oliva, R. **Posterior meningoencephalocele of the orbit treated surgically.** Arch. de Oft. de Buenos Aires, 1936, v. 11, Jan., p. 3.

In the left eye of a boy of nine years there had been noted a narrower palpebral fissure at birth and a slowly increasing exophthalmos at two years. There was no pain and no bruit but an easily reducible exophthalmos and pulsations synchronous with arterial pulse and catatropia. X ray showed uniform enlargement of the orbital cavity with separation of the sutures, disappearance of the anterior clinoid processes, and enlargement of the sella. Exploration by the classical procedure for operations on the chiasm disclosed a meningoencephalocele continuous with the temporal lobe and passing into the orbit through a defect involving the frontomalar-sphenoidal sutures. The roof of the orbit was repaired by a graft resected from the lower posterior osseous flap. Aside from X rays, exploratory puncture, and surgical exploration, differential diagnosis can be made from dermoid cysts, which remain stationary until puberty; from cavernous angioma, which disappears on carotid compression; from arteriovenous aneurism, which is not congenital and develops a bruit, and from orbital cysts. The prognosis is not favorable and cosmetic reduction of the exophthalmos is the most that can be achieved by surgery. (Illustrated.) M. Davidson.

Wald, George. **Vitamin A in eye tissues.** Jour. Gen. Physiology, 1935, v. 18, July, p. 905.

Vitamin A has been found in the retinas and the combined pigment epithelium and choroid layers of frogs, pigs, sheep, and cattle. The vitamin was identified by its specific absorption, the blue color yielded with antimony trichloride, associated with an absorption band at about 620 millimicra, antixerophthalmic and growth-promoting activity, and quantitative relationships between the results of these three types of observation. With the possible exception of hepaxanthin, no other carotinoids were found in the mammalian tissues.
M. E. Marcove.

Wieczorek, Anton. **Structure of the orbit. Correlation between the root of the nose and the inner wall of the orbit.** Klinika Oczna 1935, v. 13, pt. 2, p. 354.

By a graphic report of measurements of 256 orbits the author shows that there is a definite relation between the shape of the nose and the form of the inner orbital wall. Ray K. Daily.

Williams, H. J. **Review of aural and orbital complications of scarlet fever at the Philadelphia hospital for contagious diseases from 1922-1934.** Ann. of Otol., Rhinol., and Laryngol., 1935, v. 44, March, p. 110.

Acute suppurative otitis media was seen in 2,898 scarlet fever patients. Orbital cellulitis was seen in 48 cases.
Theodore M. Shapira.

14. EYELIDS AND LACRIMAL APPARATUS

Alexander, C. S. **Tarsectomy in incomplete ptosis.** Texas State Jour. of Med., 1934, v. 30, Dec., p. 511.

The author's operation for relief of incomplete ptosis consists in removing the tarsus with the overlying conjunctiva. The operation is applicable only to those cases which require not more than three or four millimeters of widening of the palpebral fissure. (Case reports, discussion.) M. E. Marcove.

Alkio, V. V. **The treatment of dacryostenosis with a permanent spiral canula.** Klin. M. f. Augenh., 1936, v. 96, March, p. 319.

The instrument and its employment are described in detail and illustrated by roentgen photographs. The author left it in the nasolacrimal duct for several months and observed early cessation of suppuration and lacrimation in thirteen patients. C. Zimmermann.

Almeida, A. de. **External dacryocystorhinostomy.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 101-107.

In the author's technique the trephining is carried out with burrs such as are employed in dentistry. For the suture, the author describes and illustrates a special needle which he states

is easily handled. Favorable results are reported in a number of cases.

W. H. Crisp.

Anastasi, G. **Palpebral dyschromias and ciliary poliosis.** Ann. di Ottal., 1936, v. 64, Jan., p. 59.

The author reports several cases of depigmentation of the skin and cilia. The very limited evidence in ophthalmic literature concerning the causes of vitiligo and poliosis is inadequate to classify the condition and to establish its etiology. (Bibliography.)

Park Lewis.

Anelli, Dante. **Xanthelasma.** Boll. d'Ocul., 1936, v. 15, Feb., pp. 263-278.

From histologic examination of xanthelasma the writer concludes that no difference exists between xanthelasma and common subcutaneous tissue. Xanthelasma shows the neutral fats which abound in glandular tissue, the acid fats and cholesterin which predominate in connective tissue, and the lipoids that are scattered throughout. Xanthelasma is attributed to local changes of nervous and vascular nature. (Bibliography.) M. Lombardo.

Bender, M. B. **The nerve supply to the orbicularis muscle and the physiology of movements of the upper eyelid; with particular reference to the pseudo-Graefe phenomenon.** Arch. of Ophth., 1936, v. 15, Jan., pp. 21-30.

A woman aged twenty years presented absence of associated movement of the upper eyelid upon downward gaze (pseudo-Graefe phenomenon) as a result of pressure on the oculomotor nerve by an osteochondroma which extended from the sphenoidal ridge to the sella turcica. Partial removal resulted in slight improvement in muscle action. The physiology of the lid movements and the innervation of the orbicularis are reviewed to show that the pseudo-Graefe phenomenon is based upon tonic innervation of the levator muscle by impulses meant for other muscles supplied by the oculomotor but shunted to the levator. T. Hewitt Judd.

Busacca, Archimede. **Excision of the tarsal portion of the orbicularis muscle for entropion and trichiasis and for prevention of relapse in trachoma.** Zeit. f. Augenh., 1936, v. 88, Jan., p. 100.

The author's technique represents slight modifications of other operative procedures, particularly those of Snellen, Anagnostakis, Hotz, and Chronis. The description is greatly clarified by the illustrations.

F. Herbert Haessler.

Currie, J. G. D., and Lloyd, J. P. F. **A case of secondary hemorrhage following curettage of meibomian cyst.** Brit. Jour. Ophth., 1936, v. 20, March, p. 162.

A woman aged 23 years presented a crop of nine meibomian cysts. They were curetted and on the following day appeared to be healing properly. Four days later a profuse hemorrhage occurred, soaking with blood two face towels. Where the central cyst had been there was a spurting artery. The bleeding was finally controlled by suture under general anesthesia. The patient had whooping cough. D. F. Harbridge.

Fazakas, Alexander. **Sporotrichosis of the lower lacrimal canaliculus.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 227.

Sporotrichosis was first observed by Schenck in 1898 in subcutaneous abscesses of the forearm. The skin is the most frequent seat, but it may also start from mucous membranes and the eye. In 1911 Morax described the first case of sporotrichotic dacryocystitis with swelling of the preauricular glands. Fazakas reports as unique a primary sporotrichosis of the lower lacrimal canaliculus with painless swelling of the preauricular lymph nodules. Sporotrichum Councilmani was cultivated from the obstructing granular masses and the detritus of the ulcerated wall. C. Zimmermann.

Hagedoorn, A. **Adenoma hydradenoides of a Moll's gland.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 171.

Clinical and anatomical descriptions of adenoma hydradenoides occurring in two patients of 58 and 67 years. (Illustrations.) C. Zimmermann.

Krotkov, N. V. **A unique case of synchronous closure of the lids in mastication and deglutition.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 85.

A man of 26 years came complaining that his eyes closed during mastication and deglutition of hard food. The phenomenon was not produced by masticating movements without food. The patient had had encephalitis when ten years old, and was being treated for tuberculosis. Another case was that of a man of 39 years who for six months suffered from spasm of the orbicularis and epiphora of the right eye during mastication of hard food. The author sees in these lesions a central disturbance that awakens old phylogenetic associations between mastication and closure of the eye, which probably existed in remote stages of human evolution. Ray K. Daily.

Kurlov, I. H. **The surgical technique of blepharochalasis.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 951.

The author excises a strip of redundant skin, and through an incision in the tarso-orbital fascia he removes portions of the orbital fat or of the lacrimal gland which show the least tendency to prolapse. The tarso-orbital fascia is closed with a continuous suture, the ends of which are tied on the skin surface. The skin incision is closed with interrupted sutures which include the levator. (Illustrations.) Ray K. Daily.

McClanahan, Robert. **Fungus infection of the lacrimal canaliculi.** Amer. Jour. Ophth., 1936, v. 19, May, pp. 4-18-419.

Mahoney, W., and Sheehan, D. **Experimental ptosis in primates.** Arch. of Neur. and Psychiatry, 1936, v. 35, Jan., p. 99.

This report deals with ptosis produced experimentally in subhuman primates. The authors state that intracranial division of the third nerve in animals is followed by ptosis of the upper lid, with more rapid recovery as one ascends the phylogenetic scale. Recovery from the ptosis depends on the cervical portion of the sympathetic nervous system during the first six weeks. After this period regeneration of the fibers of the third nerve to the levator of the lid occurs. Before recovery from such ptosis is complete the upper lid can be raised during extreme excitement or after injection of epinephrin. After bilateral extirpation of the superior cervical and stellate ganglia this phenomenon is still present and to a greater degree.

Theodore M. Shapira.

Pletzer, F. O. **Leishmaniosis of the skin of the lids.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 66.

Seven cases of ulcer of the skin of the lids, caused by this tropical organism, were cured by the use of Seidel's ointment. (Photographs.)

Ray K. Daily.

Sergieva, M. **Modification of the Millingen-Sapezko operation.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 244.

The modification in this marginoplastic operation for entropion consists in traction sutures on the skin margin of the lid and in fixation sutures for the transplant. (Illustrations.)

Ray K. Daily.

Wiegmann, E. **A cilium at an unusual place, in the tarsus of the upper lid.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 230.

A girl of five years presented at the middle of the everted right upper lid a lash embedded firmly in the cartilage, so that it had to be removed with cilium forceps. Either a cilium germ was left in an unusual location or (according to Erdmann's theory) there is a common cell basis for cilia and Meibomian glands, from which the cilium developed. C. Zimmermann.

15. TUMORS

Abramovicz, I. **A case of shadows of the retinal blood vessels examined histologically.** Klinika Oczna, 1935, v. 13, pt. 2, p. 271.

With a review of the literature the author reports a case of circumpapillary melanosarcoma of the choroid, in which shadows of the retinal blood vessels

could be seen in the region of the greatest protrusion of the tumor. Microscopic study of the enucleated eye demonstrated that the shadows were caused by cystic degeneration of the retina. (Illustrations.) Ray K. Daily.

Anelli, Dante. **A few cases of Krompecher's basalioma.** Boll. d'Ocul., 1935, v. 14, Dec., pp. 1628-1646.

The writer gives the clinical history of two cases of basalioma of the upper lid, one of the lower lid, two of the right and one of the left sac region, and comes to the following conclusions: The neoplasm has a slow course and usually does not cause metastasis. It appears covered by blood crusts. Histologically basal cells surround epithelial masses, and rarely the growth contains epithelial pearls and cystic cavities. It is usually avascular, and the presence of blood vessels is connected with the period of enlargement. Radium treatment is preferred to surgical. (Bibliography.) M. Lombardo.

Callender, G. R., and Wilder, H. C. **Melanoma of the choroid: the prognostic significance of argyrophile fibers.** Amer. Jour. Cancer, 1935, v. 25, Oct., p. 251.

125 cases of melanoma of the choroid followed for a year or longer showed no metastases when all areas of the primary tumor contained argyrophile fibers. Metastases occurred in 36 percent of the cases in which some areas of the primary tumor contained no such fibers and in 57 percent of the cases having such fibers in the stroma of the primary tumor. The study of argyrophile fibers, present in varying amounts in melanomas of the choroid, appears to offer further criteria for determination of relative malignancy. In a group followed for five years or longer, there were no deaths in cases in which fibers were present throughout all areas of the primary tumor. In a group having some areas without fibers, 68 percent of the patients died. The authors suggest an additional classification of tumors according to the argyrophile-fiber content, for prognostic purposes. Theodore M. Shapira.

Casanovas, J. **A case of metastatic uveal sarcoma.** Zeit. f. Augenh., 1936, v. 88, Jan., p. 86.

In the eye described and illustrated, an extensive sarcoma metastatic from a sarcoma primary in the kidney had developed. As is characteristic of metastatic sarcoma in the eye, this one had spread over the surface of the choroid. F. Herbert Haessler.

Cozza, Francesco. **Histo-clinical contribution to the study of sarcoma of the choroid and paths of extrinsecation, extraocular extension, and generalization.** Boll. d'Ocul., 1935, v. 14, Dec., pp. 1647-1686.

Five cases of melanotic sarcoma of the choroid are reported. Three were studied clinically and histologically, and two cases only histologically. Discussion includes classification as to origin of pigment, metastasis, diagnosis, prognosis, and treatment. (Bibliography, 10 figures.) M. Lombardo.

Dejean, C. **Cysts and ependymomas of the retina.** Arch. d'Opht., 1936, v. 53, Feb., p. 82.

This complete and beautifully illustrated article deals with four topics: (1) The formation of retinal cysts. These the author believes are nothing but a local reproduction of the primitive ependymal cavity. (2) Tubular formations in the ciliary body. These he considers as small ependymal tubes. They follow chronic inflammation and reproduce the characteristics of the epithelium of the neural tube, consisting of a sort of regressive metaplasia. (3) Tumors of the infantile retina. These can be understood as a neoplastic dysembryoma, reproducing different embryologic stages of the retinal nerve cells. Thus one can differentiate neuroepithelioma, neurospongioma, and retinocystoma, as well as complex tumors derived from the primitive neuroepithelium. (4) Tumors of the adult retina. Pigmented epithelioma of the iris and

ciliary or cilioretinal epithelioma are likewise dysembryomas which by regressive metaplasia reproduce the cells of the embryonic neural tube. They deserve the name ependymoma. A pathologic description of such a tumor found in the eye of a woman of 62 years is given in detail. In various sections of this tumor were discovered epithelial cells, neuroglial cells of all sorts, and different kinds of neurons.

Derrick Vail.

Gastev, A. A., Mankovetzki, S. I., and Vosnesenskaja, A. L. **Sympathetic ophthalmia in a case of malignant neoplasm.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 783. (See Section 7, Uveal tract, sympathetic disease, and aqueous humor.)

Hippel, E. **Addition to my sarcoma statistics.** Graefe's Arch., 1936, v. 135, p. 76.

Of 118 patients with ocular sarcoma reported on in 1932, 75, or 64 percent, had lived five years and more after enucleation. Of the 75, 37 are still alive. The interval of ten years or more was reached by 37, or 30 percent, of which 23 are now living. Fifteen could be followed for 20 years or more, and ten of these are still alive. Two are still alive after 30 years or more since enucleation. Thus of the original 118 patients 43, or 38 percent, did not live so long as five years after enucleation.

H. D. Lamb.

Hippel, E. **A new method for estimating the prognosis of uveal sarcoma.** Graefe's Arch., 1936, v. 135, p. 79.

The author reports on the practical application of the principle that the serum from noncarcinomatous individuals will destroy the cells of malignant tumors, whereas the serum of carcinomatous or sarcomatous patients will not, but frequently permits considerable increase in the number of malignant cells. The necessary precautions in making the test are given in detail. Of eleven cases of sarcoma observed by the author over intervals of from 10 to 29 years, seven were negative by this test. Three cases with positive findings were alive 18, 28, and 25 years respectively after enucleation. H. D. Lamb.

Moore, Foster. **Value of radium in intraocular lesions.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 3.

Almost exclusively, the group in which both eyes are involved by glioma provides cases suitable for radium treatment. Glioma was bilateral in twenty percent of the cases during the years 1871 to 1924 at Moorfields. Eight such patients have been treated with radium. Bilateral sarcoma is almost unknown, but sarcoma does occasionally involve the only eye or the better eye so that radium treatment may be considered if the patient refuses enucleation. Two such cases were treated. Two cases of angioma of the retina were treated.

All radon seeds were filtered through 0.50 mm. of platinum, and had a black silk thread attached for identification and removal. They were applied on the surface of the sclera, and were held in place by sutures or by interstitial insertion.

Changes in other tissues included chemosis, dilatation of blood vessels, excoriation of skin, loss of lashes and eyebrows, xerosis and necrosis of the cut edge of the conjunctiva, and in one case quite deep ulceration of cornea and adjoining sclera as well as retinal, choroidal, and lenticular changes. Application in the socket caused marked contraction of the orbital tissues. Cataract developed in several cases. The fundus lesion had the appearance of a healed diffuse chorioretinitis. (11 illustrations.) Beulah Cushman.

Petragnani, Vittorio. **Rare benign neoformation of the ciliary body.** Boll. d'Ocul., 1935, v. 14, Dec., pp. 1693-1711.

A man of thirty years showed a zone of atrophy on the nasal side of the left iris. The iris was here pushed forward, and in dilatation a pinkish neoformation containing some blood vessels was seen between the margin of the pupil and the lens. From its histologic aspect the author classifies the tumor among the

pseudoadenomata. (Bibliography, 18 figures.) M. Lombardo.

Rieth, H. **Two cases of metastasis to the choroid in carcinoma of the mammary gland.** Klin. M. f. Augenh., 1936, v. 96, March, p. 369.

The metastases occurred in the right eye of each patient, three and six years respectively after amputation of the right mammary gland. The choroidal vessels were completely filled with tumor cells of the type of the mammary carcinoma, and the retina was detached by serous exudate.

C. Zimmermann.

Salzmann, Maximilian. **Early stage of choroidal sarcoma and histologic basis of the ophthalmoscopic picture.** Zeit. f. Augenh., 1936, v. 88, Feb., p. 185.

In five patients with small choroidal sarcoma near the posterior pole, ophthalmoscopic picture, fields, clinical course, and anatomic preparations from the enucleated eyes are described, compared, and critically discussed. In all of them, the tumor was actually larger than was supposed from ophthalmoscopic examination. The area of pallor in the fundus shows rather the limits of the pigment epithelium. The color of the projecting mass is no index of the degree of pigmentation of the tumor. Pale creamy yellow is the color of an unpigmented sarcoma. However, this rarely becomes visible, because several conditions must combine favorably for visibility. Usually the appearance of the surface of the mass is determined by changes in the epithelium and the degree of transparency of the outer retinal layers. Visibility of vessels belonging definitely to the tumor has been mentioned as a valuable diagnostic sign but is unreliable. Much earlier than is indicated by the ophthalmoscopic picture, a serous detachment of the retina involves parts of the fundus not occupied by tumor. It begins at the periphery of the tumor and spreads distally. The source of this subretinal fluid cannot be the tumor itself, because not only is the detachment not an early occurrence, but the defective pigment epithelium becomes more firmly attached to the retina. If the choroid in general secreted the fluid, the detachment would not be so sharply localized; hence, one must assume that the fluid is secreted by the choroid in a narrow zone surrounding the tumor. F. Herbert Haessler.

Schwartz, Karl. **Clinical and anatomic aspects of tumors of the optic nerve.** Graefe's Arch., 1936, v. 135, p. 247.

A child of three and a half years presented in the left eye exophthalmos of 3 mm. directly forward, and choked disc of 4 D. prominence with some parts of the papilla appearing very solid and gray. The growth occupied the entire orbital length of the optic nerve and extended through the cribriform plate into the optic papilla. Microscopically it was considered to be a mixed form of endothelioma with fibromatosis. H. D. Lamb.

Shapland, C. D., and Greenfield, J. G. **A case of neurofibromatosis with meningeal tumor involving the left optic nerve.** Trans. Ophth. Soc. United Kingdom. 1935, v. 55, p. 257.

A feeble-minded woman 22 years old had been blind in the left eye for ten years and her right vision had been failing for two weeks. Deafness had developed rather rapidly two years previously, and during the last year walking had become increasingly difficult. There was proptosis of the left eye and movements were limited. The pupil reacted consensually but not directly. The disc was elevated 6 D. and was hazy and greyish in color, and the appearance suggested invasion of the nerve head by a growth. The right vision was 6/18 and the pupil reacted to light, but consensually was negative. There was 3 D. of swelling of this optic disc.

The general condition gradually deteriorated, and the patient died eleven months later as a noisy psychotic with a temperature of 103°.

At a postmortem examination three types of tumor were found. Two subcutaneous neurofibromas were removed. Within the cranium the tumors which were attached to the dura mater

were psammomata, the tumors of the nerve roots were neurofibromata, and the tumors of the right frontal lobe and spinal cord suggested an ependymal origin (gliomata).

Beulah Cushman.

16. INJURIES

Blaskovics, L. **Cyclectomy.** Zeit. f. Augenh., 1936, v. 88, Jan., p. 75.

Cyclectomy is indicated in prolapse of the ciliary body in scleral rupture and as a preliminary step in extraction of a nonmagnetic foreign body in or behind the ciliary body. The author incises the conjunctiva meridionally, undermines the conjunctiva to the corneal margin, makes a meridional incision half through the sclera, puts in horse hair sutures, completes the scleral incision, frees the ciliary body two or three mm. right and left of the incision, grasps the ciliary body, and abscinds the projecting part. Five examples of the operation are described.

F. Herbert Haessler.

Hartmann, Karl. **A contribution to removal of lashes from the anterior chamber.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 238.

Through a perforating wound of the cornea an eyelash entered the anterior chamber. It remained hidden by hemorrhage, exudate, swollen lens matter, and later a ribbon-shaped corneal scar. The secondary iridocyclitis immediately subsided after extraction of the lash with cilium forceps.

C. Zimmermann.

Krilov, T. K., and Levin, I. S. **A seven years study of ocular traumatism in children at the Smolensk Medical Institute.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 152.

This is an analysis of the material, and emphasizes the recreational provisions of the Soviets, which eliminate dangerous games and toys responsible for the majority of children's injuries.

Ray K. Daily.

Lennon, R. C. **Skeleton-free photography of the globe, according to Vogt.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 234.

In order to get as large as possible a portion of the eyeball upon the film, Lennon, after retrobulbar injection, pulled the globe forward on two threads passed through the insertions of the superior and inferior recti. He thus obtained exophthalmos of 8 mm. and was able to fixate the globe in any direction, at the same time holding the lids back. C. Zimmermann.

Menezo, J. M. **Action of war gases on the visual apparatus.** Rev. Cubana de Oto-Neuro-Oft., 1935, v. 4, Sept.-Dec., p. 99.

The author concludes that to produce serious effects on the visual apparatus tear gases have to be almost lethal. For lavage, permanganate of potash in 0.25 percent solution is superior to bicarbonate of soda. M. Davidson.

Neuman, Jacob. **Surgical treatment of chemical ocular injuries and its experimental and anatomic basis.** Klinika Oczna, 1935, v. 13, pt. 2, p. 292.

The author records treatment of 48 eyes by excision of necrosed conjunctiva and transplantation of mucous membrane from the lip, fastened by conjunctival and scleral sutures. Comparison of the results thus obtained with records of 109 injuries treated conservatively shows the strikingly superior results in the eyes treated surgically, relative to loss of vision and symblepharon. The author studied the anatomic processes in experimental chemical burns on rabbit and dog eyes. Photomicrographs of these eyes show rapid infiltration of the sclera and its blood vessels, leading to thrombosis of the scleral vessels. This infiltration was absent only in cases in which transplantation had been done promptly after injury. Delayed transplantation does not altogether prevent this infiltration, although in these cases it is less marked than in cases treated conservatively. These findings lead the author to emphasize the importance of immediate surgical intervention and the fact that every hour of waiting vitiates the prognosis. (Illustration.) Ray K. Daily.

Petrov, A. A. **Rupture of the sclera with subconjunctival subluxation of the lens.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 286.

Such an injury was produced by the horn of a cow. The lens was ruptured, the lens substance was dislocated under the conjunctiva, but the capsule of the lens was held in the lips of the scleral wound. Ray K. Daily.

Plitas, P. S. **The action of the electric-welding arc on the eye.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 16.

Exhaustive study of vocational conditions in electric-welding and experimental studies on rabbits, dogs, and cats demonstrate that the occupation involves the possibility of severe injury to vision. The damage is caused by the intense light, by the continuous twinkling of the light, and by the sharp contrasts in illumination resulting from the dark filters used at work. The injury may consist of acute painful electric ophthalmia, in chronic electric ophthalmia, in the form of asthenopia, subacute conjunctivitis, and blepharitis, in painless inflammation of the retina and optic nerve, and in slowly developing retinal asthenopia. Experimentally on animals all forms of acute inflammation including secondary panophthalmitis may be produced. The histopathology of the ocular lesions shows inflammatory processes in the anterior segment of the eyeball and degenerative processes in the posterior segment. Disappearance of the tigroid bodies and chromatolysis in the nuclei of the ganglion cells of the retina point to a profound permanent degenerative process as cause of the loss of vision. The best protective spectacles, as determined by a three-year period of observation, consist of a combination of green and red glass. Because pathologic processes may progress without pain, periodic ocular examinations of electric welders are obligatory. The vocational guidance department should not permit persons with lesions of the light perception apparatus to engage in this work. (Photomicrographs.)
Ray K. Daily.

Plitas, P. S. **Modifications of the visual organ under the influence of X rays of ultra-short wave length.** Ann. d'Ocul., 1936, v. 173, Feb., pp. 110-119.

Prolonged exposure to X rays of ultra-short wave length is fatal to animals. Before death there is a sharp increase in body temperature. In the eyes of cats after exposure to the rays the retina and optic nerve showed the most marked changes. In the ganglion cells of the retina there was loss of tigroid substance, vacuolization of protoplasm, and shrinkage of nuclei. The optic nerves showed cavities filled with fluid, and other early degenerative changes. Similar effects were found in the spinal cord. John C. Long.

Protopopov, B. V. **Occupational increase in corneal sensitivity among the metal workers of the Gorki automobile factory.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 265.

Study of corneal sensitivity among the various groups of workers in the automobile industry showed a rise in corneal sensitivity among workers with electrolytic vats. Ray K. Daily.

Quint. **The magnet operation from reminiscences and experiences of my medical life.** Klin. M. f. Augenh., 1936, v. 96, March, p. 371.

After removal of steel by introduction of the hand magnet into the vitreous, twenty to thirty percent of the cases ended in detachment of the retina, forty percent in enucleation on account of insidious uveitis, and a small number in panophthalmitis, while twenty percent regained useful vision. Quint recommends exact diagnosis with siderоscope and roentgen rays, gradual incision of sclera, and application of giant magnet to wound, but is against drawing the piece into the anterior chamber if it has an elongated shape.
C. Zimmermann.

Rohrschneider, W. **Injury to the lenses of animals by ultraviolet rays.** Graefe's Arch., 1936, v. 135, p. 282.

The source of the rays was the mercury-vapor point-lamp. Repeated raying up to 45 minutes in two rabbits produced no lens changes, although the animals were observed for nine months. The cornea presented retrogressive

opacity. In guinea pigs exposure of one minute caused injury to lens as well as cornea. The lens opacities always lay in the region of the pupil and involved only the capsule and the most anterior layers of the cortex. With filters it was shown that the rays affecting the lens must lie between 293 and 313 millimicra.
H. D. Lamb.

Saidakovskii, A. C. **Ocular traumatism in the "Red Star" industrial plant during 1930-1932.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 921.

The number of ocular injuries was markedly reduced after a change in the factory's illumination. Most effective the author considers educational propaganda with placards and demonstration of actual injuries. After such a campaign the workers coöperate better.
Ray K. Daily.

Sellas, Jr. **Magnetic intraocular foreign body, and its extraction with the electromagnet.** Arch. de Oft. Hisp.-Amer., 1936, v. 36, Jan., pp. 17-37.

The author's powerful electromagnet is described. It was used to remove intraocular foreign bodies in 61 cases. To prevent postoperative complications, the author uses foreign protein therapy and subconjunctival injection of from 2 to 5:1000 solution of cyanide of mercury.
R. Castroviejo.

Sengstack, J. L. **Wood splinter in the right orbital cavity.** New York State Med. Jour., 1935, v. 35, Aug., p. 809.

A large piece of wood passed through the inner table of the right orbit and nasal bone, opened the right frontal sinus, pierced the posterior part of the nasal septum, injured the vomer, left ethmoid, and left sphenoid, and lodged against the left angle of the mandible. Without complications, the patient was discharged after nine days.
Theodore M. Shapira.

Sherman, G. C. **Eyelashes in the anterior chamber as a result of trauma.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 283.

A report of a case which was treated by removal of eyelashes and linear expression of the traumatic cataract with a satisfactory result.
Ray K. Daily.

Stankiewicz, Zygmunt. **The value of Grudzinski's method in localizing metallic foreign bodies, as shown by an experience of five years.** Klinika Oczna, 1935, v. 13, pt. 2, p. 278.

Having tried Grudzinski's modification of Altschul's technique on 106 cases, the author is impressed by the simplicity and accuracy of the technique.
Ray K. Daily.

Thorpe, H. E. **A new forceps for removal of lead shot from the vitreous.** Arch. of Ophth., 1936, v. 15, Feb., pp. 308.

The forceps consist of a tubular shaft with a freely-moving center rod. These are attached to two ring-shaped blades for grasping the shot. The forceps can be inserted through a 5-m. incision.
J. Hewitt Judd.

Tillema, A. **Atypical, indirect, incomplete rupture of the sclera.** Brit. Jour. Ophth., 1936, v. 20, April, p. 193.

In each of two cases an eye was removed to relieve a painful traumatic glaucoma, and was examined microscopically. One presented a typical rupture near the corneal limbus and both had atypical equatorial ruptures. There were ruptures of the inner scleral fibers and deposition of hematogenous pigment in the inner layers of the sclera. (Bibliography, 4 photomicrographs.)
D. F. Harbridge.

Wescott, Virgil. **Concerning accommodative asthenopia following head injury.** Amer. Jour. Ophth., 1936, v. 19, May, pp. 385-391.

17. SYSTEMIC DISEASES AND PARASITES

Bienstock, F. **Allergic animal protein toxicosis and the eye.** Schweiz. med. Woch., 1936, no. 7, Feb. 15, p. 185.

Bienstock describes his own ocular symptoms during fifty years of hypertension. Symptoms ranging from spots before the eyes to total temporary blindness appeared when his diet contained albuminous foods.
Theodore M. Shapira.

Charlin, C. C. **Syndrome of the nasal nerve from bacillary toxemia.** Ann. d'Ocul., 1936, v. 173, Jan., pp. 25-31. (See many earlier papers by this author.)

Two cases of nasal-nerve syndrome secondary to tuberculous toxins are described in adolescent girls. Neuralgia was the predominant symptom in one instance and corneal ulceration in the other. In both cases there was spectacular relief from the symptoms after diagnostic use of tuberculin (Mantoux reaction). In both instances the tuberculin reaction was positive and tuberculous involvement of the hilus glands was found. John C. Long.

Dunphy, E. B. **Ocular complications of cerebrospinal meningitis.** Arch. of Ophth., 1936, v. 15, Jan., pp. 118-124.

Prompt use of serum in treatment of this disease has caused reduction of the ocular complications. The findings in the literature are summarized under the headings of uveal tract and retina, conjunctiva, cornea, pupillary reactions, extraocular muscles, and optic nerve. It is suggested that intraocular injections of meningococcus serum may be valuable. J. Hewitt Judd.

Focosi, M., and Orzalesi, F. **The pathogenic importance of some varieties of Cephalosporium in the eye.** Boll. d'Ocul., 1936, v. 15, Feb., pp. 149-188.

In tabulated form the writer gives the results obtained by inoculating different varieties of Cephalosporium, taken from mycotic human skin into the conjunctiva, cornea, anterior chamber, and vitreous of rabbits. The fungi did not provoke a serious reaction in the first two structures, but an intense reaction of short duration developed in the anterior chamber and the vitreous. Histologic examination of the eyes revealed marked growth of the fungi, which was arrested by reaction of the structures in the form of a marked local eosinophilia. (Bibliography, 9 figures.) M. Lombardo.

Fradkina, M. I., and Slavin, L. D. **The effect of prolonged hunger on the eye.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 874.

A man who believed that hunger was a panacea for all physical ills placed himself under medical observation for a 46-day period during which he took only water. The ocular changes found on the 46th day were shallow anterior chamber, slight retinal pallor, disappearance of the spontaneous venous pulse present before the hunger period, reduction in intraocular tension and in systolic arterial retinal tension, and a marked disturbance in dark adaptation. Eleven days after resumption of feeding these changes disappeared. Ray K. Daily.

Joyeux, C., Sédan, J., and Esménard, J. **Ocular filariasis; conjunctival lesions in a case of onchocerciasis contracted on the Ivory Coast.** Ann. d'Ocul., 1936, v. 173, Feb., pp. 100-110.

A man of 35 years, recently returned from the Ivory Coast, had extremely severe conjunctival inflammation involving both eyes. Small cylindric bodies and a number of spheric objects were seen beneath the conjunctiva. These were excised and in section necrotic masses were found surrounded by a foreign body reaction. There was no intraocular pathology, but a blood eosinophilia of 47 percent. Several subcutaneous nodules were removed and Onchocerca volvulus was identified in the nodules. John C. Long.

Lawrence, R. D., and Levy, A. H. **Vasçularization of iris and cornea in diabetes.** Brit. Jour. Ophth., 1936, v. 20, April, p. 198.

A male aged 49 years presented ocular complications twelve years after his first diagnosis as diabetic. His coöperation in treatment had been very indifferent, in spite of the fact that his blood sugar was easily controlled by insulin. The right eye showed vascular changes, yellow exudate, and a few fine hemorrhages in the retina: its vision was 6/9. The left eye had gross hemorrhages around the nerve head and macula and vision of counting fingers. The unusual feature was the development of fresh blood vessels on both surfaces of cornea

and iris, with the corneal vessels subsequently undergoing complete involution. D. F. Harbridge.

Mata Lopez, P. **Some aspects of dental focal infections in ophthalmology.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Nov., pp. 597-603.

The author studied some cases of corneal herpes and iridocyclitis which presented dental infection with no other source to account for the ocular disorder. After removal of the focal infection 12.5 percent were cured, 31.25 percent were improved, and in 56.25 percent no improvement was obtained. R. Castroviejo.

Nastri, Francesco. **The reaction of Kahn in the ophthalmologic field.** Boll. d'Ocul., 1936, v. 15, March, pp. 353-362.

The results obtained with the Wassermann and Kahn reactions in six hundred patients with various ocular affections indicate that the Kahn test is a reliable test in the ophthalmologic field, especially in cases in which the Wassermann gives a doubtful reaction. (Bibliography.) M. Lombardo.

Sala, G., and Borsellino, G. **The behavior of the eye in chronic copper intoxication.** Boll. d'Ocul., 1936, v. 16, March, pp. 344-352.

Weekly for about four months the authors injected endovenously a solution of colloidal CuS. Biomicroscopic examination during this period did not reveal any lens changes, and the fundus was always negative to ophthalmoscopic examination. Histologic examination also failed to reveal any changes in the neuroretinal apparatus. (Bibliography, 3 figures.) M. Lombardo.

Solovieva, M. K. **Charlin's nasociliary syndrome.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 108.

A patient 48 years old was relieved of ocular pain, epiphora, pericorneal infection, and orbital neuralgia by application of cocaine and adrenalin to the outer nasal wall. She was sensitive to pressure over the terminal endings of the naso-ciliary nerve, and previous treatment of the eye had been ineffective. Ray K. Daily.

Tille, H. **Ocular manifestations in purulent otitis and its complications.** Rev. Oto-Neuro-Oft., 1936, v. 11, Feb., p. 31.

A sixth-nerve lesion may indicate a cerebellar abscess or intracranial hypertension as well as a Gradenigo syndrome. Involvement of the fifth followed by the third and sixth occurs in grave meningitis or cavernous sinus thrombosis. A third-nerve lesion points to temporoparietal lobe abscess. Fourth-nerve involvement is rare. Fifth-nerve involvement requires careful analysis as to location of spontaneous headache and study of corneal sensitivity and points to an anterosuperior petrositis. Papilledema is always preceded by hypertension of the retinal arteries, which therefore deserves study in the course of otitis. Papilledema may be a late complication of cavernous-sinus thrombosis and cerebral or cerebellar abscess. M. Davidson.

Triandaf, E., and Nitzulescu, J. **Ocular manifestations of trichinosis.** Arch. d'Opht., 1936, v. 53, Jan., p. 47.

Trichinosis is a disease rarely found in Roumania. The authors have collected fifteen cases to date, and report three cases in which the face and lids of the patient were affected. They were members of the same family who after ingestion of suspected pork presented the same disease, but variable in its intensity. The most characteristic disturbance was palpebral and facial edema. Eosinophilia (eighteen percent) clinched the diagnosis. (Bibliography.) Derrick Vail.

Vancea, P. **The eye and the endocrine glands.** Graefe's Arch., 1936, v. 135, p. 1.

The author reviews the relations, as reported in the literature, between eye and hypophysis, thyroid, parathyroid, liver, pancreas, adrenals, and genital glands. H. D. Lamb.

Zolotnitzkii, I. H. **Syndrome of the nasal nerve.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 5, p. 956.

A report of three cases of nasociliary syndrome. Ray K. Daily.

18. HYGIENE, SOCIOLOGY, EDUCATION, HISTORY

Barkan, Hans. **Ophthalmic errors.** Trans. Amer. Acad. of Ophth. and Otolaryng., 1935, 40th annual meeting, pp. 156-164. (See Amer. Jour. Ophth., 1936, v. 19, Feb., p. 129.)

Biro, I. **The causes of blindness. Statistics of 1,000 cases.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 209.

This is a sequel to the statistics of Grosz in 1899 and of Scholtz in 1907, based on records of 124,579 patients of the eye clinic of Budapest during the five years from 1928 to 1933, which showed 1,000 persons incurably blind in both eyes. Counting fingers at 0.5 m. was taken as the upper limit in the definition of blindness. The affections causing blindness are grouped according to anatomic parts, as of conjunctiva, cornea. Compared with Scholtz's 9.46 percent, blennorrhea neonatorum showed 5.3 percent; gonorrhea of adults 5.38 and 0.7 percent respectively. Trachoma showed no important differences from Scholtz's 2 percent, but the actual percentage is greater if one considers that the frequent relapses and distressing subjective symptoms incapacitate more people for work than indicated by statistics. Affections of the uvea increased to 25.3 percent compared with Grosz's 6.78 and Scholtz's 15.16 percent, chiefly because of myopic changes, choroiditis, central atrophy of the choroid, lues and tuberculosis. Etiologically unexplained were 97 cases. Pigmentary degeneration of the retina gave 3.4 percent, chorioretinitis 3.2 and retinal detachment 3.5 percent, simple atrophy of the optic nerve 15.8, atrophy from neuritis 3.2, inflammatory glaucoma 15.1, simplex 2.2, injuries 10.7.

C. Zimmermann.

Carris, L. H. **Activities of state commissions for the blind in the field of prevention of blindness.** Sight-Saving Review, 1935, v. 5, Sept., p. 187.

The activities of the National Society for the Prevention of Blindness are outlined and the importance of a prevention of blindness department in state commissions for the blind is emphasized. Edna M. Reynolds.

Cushman, Beulah. **Dr. George Francis Suker.** Illinois Med. Jour., 1935, v. 67, March, p. 259.

This excellent article on Dr. Suker is by his former associate.

Theodore M. Shapira.

Esser, A. A. M. **On triophthalmia.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 242.

This synopsis of Greek, Roman, East Indian, and Japanese literary sources gives the mythologic, cosmologic, pathologic and teratologic components of triophthalmia, which is also found in German, Slavic, and modern Greek myths. It shows triophthalmia as the attribute of the highest deity. Esser sees in triophthalmia a naïve conception which is not satisfied that the superhuman divine being should have only two eyes, like the human race, but symbolizes the divine vision into things surpassing human reason by a third eye in the middle of the forehead, a kind of prophetic eye. C. Zimmermann.

Feilchenfeld, Wilhelm. **Form of the eye in sculpture.** Klin. M. f. Augenh., 1936, March, p. 382.

Greeff's opinion that the ancient Greek sculptors gave the eye a smooth curved surface which created the impression of blindness is erroneous. Feilchenfeld shows that in Greek and Roman sculpture the eyes were painted or a pit was chiseled out at the site of the cornea, iris, and pupil, and sometimes colored precious stones were inserted into the holes. (See also editorial, Amer. Jour. Ophth., v. 19, June, page 520.) C. Zimmermann.

Greef, R. **Postage stamps with pictures of physicians.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 253.

The pictures mentioned are of Donders, Boerhave, Guyot, Pasteur, Ballay, Semmelweiss, Adamantios, Grossié, Zamenhof, Pawlow, Kaczkowski, and Fernandez. C. Zimmermann.

Grosz, Stephen de. **Injuries of the eye caused by sports.** Brit. Jour. Ophth., 1936, v. 20, March, p. 148.

The author discusses the bases of success in sports, the question of the

use of glasses, and the hazards of various sports. D. F. Harbridge.

Jones, J. G., Hemphill, F. M., and Pinckney, J. M. **Eye health study of Texas school children.** Bureau of Nutrition and Health Education, Univ. of Texas, Austin, 1934. Reprint.

In 5,748 school children between the first and eleventh grades, an attempt was made to determine the percentages of various eye defects. The lighting problem was studied thoroughly.

Twelve percent or 686 of the children had defective vision; 433 were hyperopic; 415 had compound hyperopic astigmatism; 201 were myopic; 103 had compound myopic astigmatism. About 2.8 percent had pathologic eye conditions and many of these had more than one defect. M. E. Marcove.

Kastrup, Marguerite. **A study of occupations of partially sighted boys and girls.** Sight-Saving Review, 1935, v. 5, Sept., p. 195.

This is a report of a three-year survey of the employment status of former sight-saving-class pupils of the Ohio public schools. Lists of occupations in which they have been employed are given and occupations which are considered satisfactory for myopes and those having low vision are indicated. Edna M. Reynolds.

Kisin, P. E. **Color-blind railroad engineers and the problem of vocational selection for transportation.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 883.

The problem discussed is that of eliminating experienced color-blind engineers from the railroad and marine services without crippling the efficiency of these services. Ray K. Daily.

Kleefeld, G. **Emile Gallemaerts (1860-1935).** Ann. d'Ocul., 1936, v. 173, Feb., pp. 97-100.

A brief biographic sketch. John C. Long.

Koval, V. P. **Histopathology of postoperative complications.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 799.

This is a detailed microscopic report of 28 eyes, 21 of which were enucleated after cataract extraction, 3 after antiglaucomatous iridectomy, 1 after optical iridectomy, 2 after Elliot trephining, and 1 after opticociliary neurectomy. (Illustrations.) Ray K. Daily.

Lech, Jr. **Vision of railway employees.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 54-70.

The author records such regulations as exist with regard to visual examination of employees on the various Brazilian railways. There is no law as to such visual examination, and only a few of the Brazilian railways pay any attention to the question. The author urges legislation and suggests standards. W. H. Crisp.

Mason, R. E. **Minimal visual requirements for safe driving.** Jour. Missouri State Med. Assoc., 1935, v. 32, Sept., p. 367.

The author states that for safe driving one eye must have at least 20/40 visual acuity with or without correction, and the other eye not less than 20/100. A person with one eye should have at least 20/30 and a normal field. Color blindness is no cause for rejection. No one should drive who has less than a 125° visual field in the horizontal meridian with one or both eyes. Where glasses are required to bring the vision up to 20/40 in one or both eyes, they should be compulsory for driving. Theodore M. Shapira.

Neustadt, I. E., Shubova, T. B., and Mkrticheva, L. I. **The effect of the qualitative spectrum of illumination on vision and productivity.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 117.

The ultimate objective of this investigation is determination of the best type of chromatic illumination for the various industries. The criteria for study were visual acuity, maintenance of clear vision, rapidity of recognizing details, color perception, visual fields, and productivity. The studies were made during a working day or extended over a series of days. The subjective findings as well as the psychic reactions point to yellow light as best and to blue as least desirable. The subjective reaction to light appears only at the beginning

of work. The eye soon becomes accustomed to the chromatic structure of the light, but reacts to variations in intensity. Retinal sensitivity is greatest in yellow and yellow-green light. Relative to visual acuity, maintenance of clear vision, and recognition of details, yellow light is best, followed by green, red, and lastly blue. On the average, white light ranks just below yellow. For visual acuity and recognition of details it is in some test persons equal to yellow light and occasionally superior. Orange light is in all respects superior to blue light but inferior to white. Contractions of the visual fields after work were greater in green and yellow light than in blue. Ray K. Daily.

Rameev, R. C. **Education in the fight with trachoma.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 138.

The author describes the various educational measures used in his district. For this work the ophthalmologist must also be an educator. Ray K. Daily.

Reis, Wiktor. **Three-eyed person and three-lens spectacles.** Klinika Oczna. 1935, v. 13, pt. 2, p. 369.

The profusely illustrated book by Netto and Wagener on Japanese humor contains a colored woodcut of interest to the oculist. A work by a famous Japanese artist, who lived 1760 to 1849. represents a spectacle vendor offering spectacles with three lenses to a person with a third eye in the center of his forehead. The symbolism of the picture has remained unexplained. (Illustrations.) Ray K. Daily.

Samuels, Bernard. **The Royal London Ophthalmic Hospital; a visit to the King George V extension.** Arch. of Ophth., 1936, v. 15, Feb., pp. 185-194.

The author describes the physical equipment and arrangement of the King George V extension to Moorfields. The ground floor is occupied by the out-patient department, divided into five separate surgeons' clinics each self-contained, with its own cubicles for ophthalmoscopic, slitlamp, and perimetric examination. On the first floor are the orthoptic and physical therapy departments, the library, and the museum. On the second floor are the pathologic and bacteriologic departments and the main lecture hall. The various departments are clearly shown by photographs. J. Hewitt Judd.

Scheerer, Richard. **Are artificial eyes remedies in the sense of RVO?** Klin. M. f. Augenh., 1903, v. 96, March, p. 379.

The RVO (Reichsversicherungsordnung, Imperial Insurance Ordinance) distinguishes between remedies for restoration of working capacity during treatment and aids serving for preservation of working capacity after termination of treatment. A new decision of the imperial insurance office considered artificial eyes simply as remedies for disfigurement and refused compensation for them. Scheerer contradicts this from the ophthalmologic standpoint and views artificial eyes as protecting against the disturbances to which an empty orbit is exposed.
C. Zimmermann.

Strebel, J. **The "Dürer look."** Klin. M. f. Augenh., 1936, v. 96, March, p. 388.

Strebel describes self-portraits made at different ages by Albrecht Dürer Jr., who settled at Nürnberg in 1455. They show the right eye in the position of strabismus divergens sursumvergens. (Illustrations.)
C. Zimmermann.

Tillim, S. J. **Trachoma among American Indians.** Sight-Saving Review, 1935, v. 5, Sept., p. 176.

Trachoma in its most virulent form affects 40 to 50 percent of the children in the Indian schools of Arizona and New Mexico. Reliable data for the incidence of trachoma among the adult Indians in this region are not available. It is estimated at about 27 percent. The Indian population of Arizona and New Mexico is 78,000. The Indian Service has been coping with the problem of trachoma for over 25 years. Appropriations for conservation of health have grown from $40,000 in 1910 to $3,213,000 in 1933, yet the percentage of trachoma among the tribes in the Southwest has not changed in this in-

terval. This the author attributes to absence of systematic educational campaign as to the nature and treatment of trachoma. He believes that neither hospitals nor physicians are delivering their full potential values.

Edna M. Reynolds.

Zachert, Marjan. **The fight with trachoma.** Klinika Oczna, 1935, v. 13, pt. 2, p. 441.

The antitrachomatous work in Poland is directed by the Ministry of Social Service, and has a budget of sixty thousand dollars. The fight is carried on through four hundred dispensaries, two sanatoria for children, fifty hospital services, and two ambulatory services. (See also Amer. Jour. Ophth., 1935, v. 18, Sept., p. 902.) Ray K. Daily.

19. ANATOMY, EMBRYOLOGY, AND COMPARATIVE OPHTHALMOLOGY

Der Brucke, M. G. **Cyclopia.** Arch. of Ophth., 1936, v. 15, Jan., pp. 114-116.

A seven-and-one-half-pound premature infant presented a single centrally placed eye, a diamond shaped orbit, total absence of the nose, and presence of a proboscis. (Photograph.)

J. Hewitt Judd.

Kahmann, Hermann. **The foveal vision of the vertebrates.** Graefe's Arch., 1936, v. 135, p. 265.

A fovea was observed in 21 marine bony fishes belonging to 10 families. In the cases observed it was a fovea lateralis, incompletely developed and showing moderate depth up to a flat depression. Thirty kinds of reptile belonging to six families were found to present a retinal fossa. Here there exists a fovea centralis. A fovea lateralis exists only in two varieties of snakes. The fovea of reptiles, with the exception of Warana lizards and snakes, is completely developed. H. D. Lamb.

Propper, H. I. **Studies on the eye at the department of physiology and pathology of the sensory organs of the Pan-Soviet Institute of experimental medicine.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 878.

The author enumerates the research problems in the course of study at the Institute and describes some of the experimental data on comparative morphology and embryology of the eye. (Illustrations.) Ray K. Daily.

Trovati, Emma. **Reciprocal position and size of the eyeball in relation to morphologic development of cranium and orbit.** Ann. di Ottal., 1935, v. 63, Dec., p. 881.

In over four hundred individuals ranging from early infancy to old age, the author made accurate measurements of the anterior, posterior, and transverse diameters of cranium and orbit, the transverse diameter of the eyeball, the base line of the cornea, and the interpupillary distance. The results were in accordance with previous findings, that is, all the diameters of the cranium and orbit increased in size progressively from the first month to adult life, in both male and female, up to fifty years of age. Up to the seventh year there was a tendency for the anteroposterior diameter of the skull to exceed the transverse. From the seventh year to the eleventh year the transverse diameter prevailed. The diameters of the orbit increased with those of the cranium.

The base line increased rapidly and progressively up to adult age and proportionately with the transverse diameters of the cranium and the orbit. The orbit reached its highest development during the twenties. The respective relationships between cranium and orbit and between the relative measurements of the eyeball and the baseline were not constant throughout the different ages. (Bibliography.) Park Lewis.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth
640 S. Kingshighway, St. Louis

News items should reach the Editor by the twelfth of the month.

Deaths

Dr. Louis Alfred Roller, Grand Rapids, Mich., died May 4, 1936, aged 81 years.

Dr. Clarence Eugene Kjos, Mount Vernon, Wash., died March 26, 1936, aged 36 years.

Dr. H. Hershey Farnsler, Harrisburg, Pa., died March 14, 1936, of nephritis, aged 57 years.

Dr. Henry Harve Look, Kansas City, Mo., died March 14, 1936, of pneumonia, aged 57 years.

Dr. A. C. Macleish, Los Angeles, died May 5, 1936, of heart attack, aged 49 years.

Miscellaneous

A convention of the Guild of Prescription Opticians of America was held on June 1st, 2d, and 3d, in Cleveland. Dr. William Evans Bruner of Cleveland introduced the guest speaker, who was Dr. L. Waller Deichler of Philadelphia.

Beginning Monday, July 27, 1936, the Department of Ophthalmology of the University of Rochester, School of Medicine and Dentistry, will conduct the Seventh Annual Summer Graduate Course of lectures and demonstrations in Ophthalmology. The course will cover a period of five days and will end on Friday evening, July 31st.

On May 17th, Works Progress Administrator Hopkins announced from Washington that $40,000 had been allocated for the manufacture of book recordings. The average full-length novel may be recorded on both sides of fifteen records.

The National Society for the Prevention of Blindness has announced that courses for the training of teachers and supervisors of sight-saving classes will be offered at the 1936 summer sessions of: (1) University of Cincinnati, June 22d to July 28th. Miss Estelle Lawes, who will be director of the course, is director of the department of sight conservation, Cincinnati Public Schools. (2) University of California at Los Angeles, June 27th to August 7th. Miss Frances Blend, who will be director of the course, is principal of sight-saving classes, Los Angeles City Schools. (3) State Normal School, Oswego, New York, June 29th to August 7th. Miss Matie M. Carter, who will be director of the course, is state supervisor of sight-saving classes, New York State Education Department. (Course to be given in Syracuse.) (4) Teachers College, Columbia University, New York, July 7th to August 14th. Mrs. Winifred Hathaway, who will be director of the course, is associate director of the National Society for the Prevention of Blindness.

Societies

Dr. J. P. Miller, Grand Forks, was elected president of the North Dakota Academy of Ophthalmology and Oto-laryngology, and succeeds Dr. Trygve Aftedal, Fargo, who presided at the meeting held in Jamestown, N.D., May 18, 1936. Dr. H. Rosenberger, Bismarck, is the vice-president and Dr. F. L. Wicke, Valley City, was reëlected secretary-treasurer. Dr. Erling W. Hanson, Minneapolis, was the visiting clinician and spoke on Allergy in ophthalmology. Other speakers were Dr. G. A. Larson, Fargo; Dr. G. M. Constans, Bismarck, and Dr. M. A. Youngs, Grand Forks.

The General Assembly of the International Association for the Prevention of Blindness and the International League for the control of Trachoma met in Paris on May 11, 1936.

The following are the newly elected officers of the Omaha and Council Bluffs Ophthalmological and Otolaryngological Society: president, Dr. W. H. Stokes; vice-president, Dr. A. J. Young; secretary-treasurer, Dr. Delbert K. Judd.

The Washington D.C. Ophthalmological Society met on May 4, 1936. Dr. Frank D. Costenbader presented a case of Juvenile macular exudative retinitis and Dr. H. R. Downey presented a case of Embolism of the retinal artery. Major Raymond O. Dart of the Army Medical Museum addressed the Society on Ocular tumors. Dr. Benjamin Rones gave a paper on Groenouw's nodular dystrophy, which was discussed by Dr. W. Thornwall Davis. Dr. Deane B. Judd of the National Bureau of Standards presented a paper on Color blindness and anomalies of vision.

Personals

On May 9th Dr. John M. Wheeler, Professor of Ophthalmology in the Medical School of Columbia University and director of the Eye Institute at the Columbia-Presbyterian Medical Center in New York, was presented with the Leslie Dana Gold Medal for "outstanding achievements in the prevention of blindness and the conservation of vision" at a dinner in his honor in St. Louis. Dr. Wheeler was selected for the award by the National Society for the Prevention of Blindness in coöperation with the St. Louis Society for the Blind, which offers this highly prized mark of recognition annually.

Dr. Don Marshall has been appointed full time Assistant Professor of Ophthalmology of the University of Michigan Medical School.

Dr. Girolamo Bonaccolto has been appointed Assistant Professor of Clinical Ophthalmology in Columbia University.